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WHAT'S INSIDE

Although we may not have had the privilege of witnessing the birth of statistical graphics shortly before the turn of the nineteenth century, we have been there to see them come of age in at least one area: PC-based business graphics software. Current dedicated charting packages deliver graphics that not only communicate information but are pleasing to look at-a far cry from the Lotus 1-2-3-generated af-



To create the senior technical editor, type in HUMMEL.ASM, assemble, link, and run EXE2BIN. Jenore the "No Stack" error.

terthoughts that have become synonymous with business graphics in its infancy.

The differences between output produced by the ten top packages reviewed in our cover story and that created with Lotus can only be described as striking. But as contributing editor Jim Seymour points out in his introduction, the improved quality of visual images is just one of many strides business graphics software has made in the last few years. "Screenshow" capabilities for sequencing and presenting images, hot links to spreadsheets and databases, and the promise of dynamic data exchange (DDE) for trading information among programs in real time tell the other part of the story, beloing presentation graphics software earn a position among the top business applications equal to that of databases, spreadsheets, communications packages, and word processors.

Going one step further, a new graphics output medium-the LCD overhead display-is making it possible, practical, and affordable to show real-time images to large audiences. Just read Frank Bican's article, "Presenting . . . Real-Time Overhead Displays for the Big Screen," in this issue for the lowdown on ten of these ready-to-travel LCD units ranging in price from \$895 to \$1,580.

When it comes to productivity, you can't have too much of a good thing. This issue brings Part 3 of our Lab Notes series on mastering laser printers, featuring the gospel of downloadable fonts according to senior editor, technical columns, Craig L. Stark. To let you take advantage of your laser's talents, senior technical editor Robert L. Hummel (programmed above) offers his latest utility, ASPRN, a macro program for printer commands.

And in anticipation of the April 15 deadline for federal income tax return filing, After Hours again focuses on tax preparation programs. Each of the programs reviewed-AM-Tax, Ask Dan About Your Taxes, and EasyTax-approaches automated income tax preparation from a slightly different perspective. The overview following the reviews will help you decide which program can best help you streamline the process of filing your 1987



your laser printing capabilities. Increases overall printer performance. Yet preserves HP functionality and warranties.

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Business Graphics Software: At the Top of the Charts Jim Seymour/ The top ten business graphics packages are putting Lotus 1-2-3manufactured charts to shame with dazzling 3-D effects and a slew of options. PC

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WORD PROCESSING Having It All: Integrated Word Processing Packages Jim Symour! The second part of PC Magazine's word processing roundup zeros in on 18 integrated packages. With their short learning cycles, easy exchange of data among modules, and greater value for your dollar, these multifunction packages are worth a close look. How do beit word

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Cover Photograph:
Roberto Brosan
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Inset: Thom O'Connor



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The First Looks section is the designated em point for all new products into the pages of PC Manazine. This late-cloune section has a nes paperlike deadline, which allows us to review new products within a few weeks of our press date. If you have a new product, contact Gus Venditto, Sensor Editor

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agned to be the most complete product eva tions in the industry. Months of planning and research on into each your. But products can be considered for review only if we k them, so keep the features staff informed of your latest products. Contact: Bill Howard, Executive Editor Carol Elison, Associate Editor Nora Georgas, Associate Editor Cheryl J. Goldberg, Associate Editor Robben Juris, Associate Editor

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grams, tutorials, user tips, and applications advice to help our readers gain technical profi ciency. We're very interested in receiving tips (on disk, please) and are eager to hear from assembly language programmers who can help us develop useful PC Magazine utilities. Unfortunately, because of the large volume of mail, we can't acknowledge or respond to all

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That's because the idea of a memory resident spreadsheet makes sense, one that you can pop-up instantly while working in your word

disenticing

Fi for help or Fig for menu

12 94am Jan 1, 1988

way we dreamed a spreadsheet would function. Everyone who has seen it says things like, "Lucid 3-D is how software of the 1990's will look and perform".

or even more to the point "This is the way 1

thought a computer should work see, Lucid is exciting.

way. Users say "It is so intuitive that I really don't need a manual." That's because we use something we call a visual command menu. Jim Seymour, the noted PC columnist, talking about Lucid in a recent article said that, "If there ever was an interface idea so good it ought to be stolen and widely used, this is it.

What he was talking about is a new menu approach that follows a simple design concept: it is easier to recog-



the widebar to that cell and press one key (grey +).

What Makes it so Special In the

screen examples

you can see Lucid multi-dimensional. Any cell of the spreadsheet can contain a complete

other spreadsheet that you can access with a single keystroke. It is as simple as the pictures show. And you don't have to write formulas to do that. All you do is go look at the other file, navigating through easy, point and shoot directories. When you come back up (with one key) the link is made automatically for you.

Everything about Lucid works that

choices are made on a menu that take you to lower levels you always can see exactly where you came from and where you are going. The complete menu path is always visible. You cannot get lost several levels down. This means you never have to remember a command, you just flow right to it.

nize than it is to remember. As

FIG. 2 Here we are instantly. Notice the lower left corner showing we are on level 2. You can go down or up. (See next page)

processor or any other program. Lucid lets you cut anything on the screen and paste it right into Lucid. or cut anything from a Lucid worksheet and paste into the application below. You can even run Lucid on top of 1-2-3 if you like, and cut and paste information from one to the other, including formulas Lucid 3-D was developed over the

past two years with countless, exhaustive hours of planning and programming to produce something spectacular. This is a product that works the

Any cell can contain a complete other spreadsheet that you can access with a single key.

Plus, no matter where you are on a menu or what you are doing, just press function key F1. and you will get a help screen specific to that command or action. Or if you want to know about any subject you can pop up an index of over 400 topics and select the one you want.

Notepad Behind Every Cell

HEROLDS CHARLESTER ON THE COURSE OF THE

Another 3-D feature is that any cell can also contain a multiple page note that you instantly access with a single keystroke. You can write

12 Man Jan 11 1988 Fi for help or Fig for sens linespapers

Fi for help or F18 for mens disertising FIG. 3 We want more detail, so let's go to Newspapers, just press the Grey + Key

The best idea I've seen for a spreadsheet in years. Ilm Seymour, Columnist, PC Magazine, PC Week hely or Fig for mer

FIG. 4. Now, instantly we are on level 3. Each level is a different spreadsheet. You could now move to the New York Times and see the detail on that figure. There is no limit to the levels you can go. Move right down to transaction level if you like.

notes, memos or letters that relate to your work, save them as individual files and even print them separately or with your spreadsheet.

Lucid 3-D is truly revolutionary. It is fast, fast, fast! It is incredibly quick in performing calculations because it doesn't recalculate every cell every time you insert an entry. Instead, it only recalculates the specific cells that are affected by your change. This is called minimal recalc. Lucid also has a remarkable innovation called background recalc in which you are given control of the cursor the moment calculations affecting your viewing screen are completed. Other calculations you don't see continue on in the background during the next commands. The end result of this powerful combination is you rarely wait for a recalculation with Lucid. You find out what instantaneous is all about.

Lucid Learns Lucid 3-D also lets you teach it any combinations of keystrokes so that involved sequences

can be.

done with single keys. Plus more than just remembering keystrokes, Lucid allows you to create Macros with loops. procedures and conditional branching amazingly all done automatically with simple menus. You can create your own menus that show the new features you have taught it. Another great feature is you can make your custom menus work like Lucid where one choice can take you down a level to a whole new set of choices. What's nice is that they will work from one

spreadsheet to another.

Fig. 5. Of course, Lucid does multiple windows, Notice you can simultaneously open windows in different directories, different drives, even down as man as 3-D levels as you like. No one else cando that.

Mouseability

Lucid 3-D was designed for both keyboard enthusiasts and mouse lovers alike. You can take your pick. Designed around the mouse from the ground up, the interface is smooth and natural. You select files to load from directory lists. Everything is point and click. What's more, any Lucid 3-D menu selection can be "moused" and the response time is "right now" instead of the sluggish "a little bit behind you" feel of add-on mouse menu systems like those you've seen with 1-2-3.

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FIG. 6 We need those budget figures in the Word Perfect letter we are writing, Clipboard Dump does it right now.

A window pops up with a library of function names you can page through with the mouse. Select, click and it's in the formula with no typing required. You even have a label window that you can fill (from the keyboard) with favorite labels and names so that you can insert them later with the mouse. There's even a pop-up calculator to insert numbers so you don't have to go to the keyboard very often.

It really permits that feeling of becoming one with your work. Lucid 3-D has windows of user defined range names as well as the macros named by the user that can be selected just by pointing and clicking, Icons that are easy to grab with the mouse let you resize and move the spreadsheet window with the ease you would expect. Plus you can go anywhere on the sheet by moving the mouse and clicking on the spreadsheet borders. And remember Lucid is designed so that any of those features are done with or without the mouse easily and quickly.

When you are staking a big decision on information gained from a spreadsheet you need to be certain that you have made no mistakes. Lucid offers five audit displays and printouts.

Masterwork

We could go on at great length about all the features and innovations in Lucid. but Lucid is more than a bag of features. What is most important is the pride and craftsmanship that went into its creation. It is a master-



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closed are my estimates for the June 1988 Budget. Depense Budget June 1988 FIG. 7 Here it is right in Word Perfect (or any word processor) just like you Got back to me as seen as possible. typed lt. Thusler You can go the other way James Johnson just as easily. C:\EHIGHT\JOHESON.NP Doe 1 Pg 1 In 1

work. The overall feel is tight and polished. In fact, Paul Somerson, executive editor of PC Magazine, used one word to describe it, "Slick"

PCSG has built a reputation as a development laboratory producing products that you know are excellent. In 1983 PCSG dominated the Model 100 laptop market with ROM based software that every reviewer rated as excellent. In 1985 we produced **UGHTNING** the pioneer and award winning Disk speed up software. In 1986 we developed the IREARCON 200 accelerator board that blew everything else out of the water, and later we topped ourselves with the Breakthru 12. Now in 1987 those who have worked with Lucid 3-D tell us "you have done it again. This is software everyone should

have."

Even if you don't plan to abandon 1-2-3. Lucid makes sense. Files are converted between them with ease so there's not an interoffice compatibility problem. This means you can have the power and fun of Lucid 3-D without having to upset your present

Pos 5

systems. We are excited about Lucid 3-D. But don't take our word for it, take us up on our 60 day offer. Call us on our order line number and we will ship your order the very next day. This \$99 offer won't last because we will be shipping to the dealers soon. But in the mean time we invite you to try Lucid as part of our "spread the news" campaign. Just pick up the phone and call us. We accept all major

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ure-perfect transmission for CAD/CAM and graphics."

actually transmits nearly twice as fast as other modemsup to 18,000 bps without data compression. Keep that in mind when comparing modems.

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LETTERS TO PC MAGAZINE



THE WORD ON WORD

Edward Mendelson's review of Microsoft Word 4.0. "The Latest Word," PC Magatine, December 8, 1987) has given me the opportunity to return a long-overdue courtesy. A few years ago, in a Yale Review article, Mr. Mendelson was kind enough to compliment my reliability and insight in reviewing word processors for the Whole Earth Software Catalog, 1, in turn, over the years have followed his increasingly

insightful commentaries on word processing and was delighted to see that you had recruited him for PC Maga-



zine.

I think Mr. Mendelson writes the most intelligent and

most intelligent and helpful reviews of word processors anywhere—no hype and no vague generalities, just clear descriptions, meaningful comparisons, and sound conclusions. His coverage of the newest version of Word was right on the money.

Charles Spezzano, Ph.D. Denver, Colorado

Let me congratule Mr. Mendelson for his arricle "The Latest Word." Having just upgraded to Word-40, I found morth of his comments right on target. However, the word of his comments right on target. However, the word of his comments right on target. However, the word of his comment of his co

in this latest incarnation. But I'll stick with Word in the hopes that someday Microsoft will get it right.

Steven A. Melnyk, Ph.D. Haslett, Michigan

Thank you for Edward Mendelson's "The Latest Word." Until I read it. I'd almost lost sight of the virtues of *Microsoft Word* 4.0 while struggling with what I consider a significant flaw.

As far as I've been able to determine, no provisions have been made for the conversion of user dictionists have been made for the conversion 3.1 for earlier) for use with Version 1.1 for earlier) for use with Version 4.0. According to Microsoft's product support people, I have the option of either using the old 3.1 spelling checker—and thereby sacrificing the enhancements innerent in 4.0—or re-creating all user dictionaries in their entirety. Neither option provides a satisfactory solution.

This defect, combined with my receipt of an unreadable printer-distribution disk, has dampened my enthusiasm for Microsoft Word 4.0.

Barbara K. Finnegan Sun City, California

Microsoft Word gives you three user distionaries: one for adding to the standard dictionary, one for special purposes (they call it the user dictionary), and one for the document you're checking, In versions of Word previous to 4.0, additions to standard dictionary were kept in a file called UPDICT.ORP; in Word 4.0, The them changed to a file called UPDIA 4.0, but rename the file and copy it to the subdirectory containing Word 4.0.

The user dictionary created for the document you are checking-which has the same filename as the document with a filename extension of .CMP—has been moved from the subdirectory containing the spelling checker to the subdirectory containing the file, which is probably the one you set using the Transfer Options command. To use your old document dictionaries with Word 4.0, just copy them from your old Word subdirectory to the correct document subdirectory.

correct document subdirectory.
While you're at it, you'll want to copy
your user dictionary, called SPECIALS.CMP, to the Word 4.0 subdirectory. Do those three things, and you'll be
off and running with Word 4.0's spelling
checker—El

A TAXING ISSUE

A HAING ISSUE.

I must take issue with Walt Rowinsky's sidebar "Tax Law Threat" ("The No-Sweat Way to Pump Up Your PC: Mail-Order Hard Disks," PC Magazine, December 8, 1987). While the mail-order

companies may be exaggerating a little when they say the law will put them out of business, I agree that it would be a great burden on them. Can you imagine whal your



publisher would say if someone suggested the pay taxes on subscriptions to all entities (state, county, or city) across the nation that placed local taxes on subscriptions? A much better idea would be just to pass a law that exempts interstate shipments from state and local taxes. This would make the current operation legal, but keep the status quo.

James Schumacher Fort Worth, Texas

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LETTERS

CO COM PUTS IT TOGETHER I want to thank PC Magazine for your Interactive Reader Service and the various programs one may download from it. I also want to give special thanks to Michael J. Mefford for his three excellent programs: DR.COM, RN.COM, and CO COM (Utilities, PC Magazine, August, September 29, and December 8, 1987). They are wonderful programs for organizing, copying, and so forth-and no one should be without them. That they also come free from your magazine is somewhat astounding in this modern world. J. Nicholas McGrath

Aspen, Colorado

If you kept a tally on all those calling in on your Interactive Reader Service, you would find that I spend a lot of time downloading programs. You have put out a lot of iewels, for which I want to thank you.

I have various commercial DOS shells for my AT, but RN.COM and DR.COM, combined with CO.COM, put everything to shame for my purpose. I have tied these all together with DOSKEY.COM, which I have configured as follows: F3 calls RN. F4 calls DR, and F5 calls CO. This works fantastically! This approach has enabled me to remove some of the TSRs that I used in the past and has freed up a lot of memory. And when I anticipate the need for a TSR program that I don't have loaded, I use your INSTALL.COM and REMOVE .COM and really love it. I never thought I would have so much memory available and still do what I want to do

John V. Starbuck Vista, California

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REMOTE SUPPORT I enjoyed Frank J. Derfler, Jr.'s Connectivity Clinic article about remote job processing on a LAN (PC Magazine, December 8, 1987). Spare computational resources on a network have been overlooked for too long. As a developer and user of a remote job processing system, I support the contributor, Garry Star, in stating that such a system is a tremendous boon to productivity.

Your readers may be interested in knowing that KeyLogic has recently released a version of our remote job system, LANBatch, for Novell networks. LAN-

Batch offers many features and options of a professional batch job system not found in the offering by Mr. Star. Whether they choose to use our system or the one suggested by Mr. Star, however, I believe all of your readers who are network users will benefit from the use of a batch job system.

Karen Middleton President, KeyLogic Durham, North Carolina

PROJECT WORKRENCH

We read with interest your review of project management ("Master Plans: Project Management Software," PC Magazine, September 29, 1987). Because Project Workbench, developed by our company, Applied Business

Technology Corp., is one of the industry's top five bestsellers, we would like to correct a number of errors and misleading impressions the article

***Project left in readers

minds The following inaccuracies and omissions stand out:

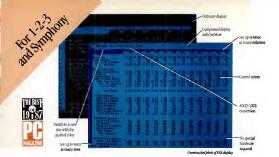
1) Your reviewer says Resource Leveling is not supported in Project Workbench. Project Workbench was one of the first to include this important feature.

2) The reviewer implies Project Workbench is not designed to handle nonstaff resources. Although our product emphasizes the management of staff resources, one of our major clients is using Project Workbench for capacity planning and scheduling of a manufacturing facility which consists of 60 heavy fabrication machines.

3) The reviewer incorrectly states that Project Workbench is non-copy protected. 4) The extensive tracking capabilities of Project Workbench are not addressed (e.g., the ability to revise start and end

dates while maintaining the original baseline, and to capture both actual resource usage and "forecast-to-complete"). The reviewer's emphasis on planning with minimal consideration given to project control is an unbalanced perspective on the functions of project management.

5) The reviewer does not mention Pro-



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Very Small	128x25	150±51	128x53	144x43	N/A
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LETTERS

iect Workbench's multiproject capabilities. Project Workbench's group reporting and subproject features are particularly strong in their ability to aggregate data at multiple levels of detail.

6) We also believe the reviewer should have mentioned these other important Project Workbench features:

■ Reports of actuals vs. plan—a key distinguishing feature. Superior speed (especially important in

resource leveling). Report preview, which, when com-

bined with the built-in text processor, allows reports to be annotated and tailored. The powerful insert and cut-and-paste features, which allow for the easy creation

of project templates. Local area network support.

We also question the basis for the following opinions on Project Workbench:

1) The integration of resource utilization and Gantt Chart on one screen, Project Workbench's unique and probably most admired feature, is criticized ("The spreadsheet becomes a little confus-

ing . . . ''). 2) The reviewer mentions Project Workbench's work breakdown structure-a feature we believe essential to all serious project management systems-but in such a way that it appears to be a limitation of our product, rather than a major strength.

3) The reviewer states that " . . . reporting features are weak." He seems to confuse quantity with quality-a few welldesigned reports with a wide variety of options are preferable to scores of separate reports (report options in Project Workbench are often separate reports in other products).

4) The reviewer comments that "At \$1,150 for the Advanced version, this program is overpriced," even though it is in the middle of the price range of the products reviewed. Since it is PC Magazine's policy to limit its commentary to the "technology of the product" and purposely exclude "service" from consideration, any judgment on price can be misleading.

Finally, 25,000 users worldwide, in such companies as AT&T, Citibank, DEC, Ford, IBM, Lockheed, Morgan Guaranty, Merrill Lynch, Mobil, Peat Marwick Main, The Hartford, Wang, Westinghouse, and many others, have found Project Workbench fairly priced and

have made it a best-seller. Danek Bienkowski Chairman of the Board

Applied Business Technology Corp. New York, New York

PC Magazine regrets the errors. For users looking for project management programs oriented toward resource-constrained or staff-intensive applications, Project Workbench is worth considering.-Ed.

CORRECTIONS/AMPLIFICATIONS

In the article, "EGA Plus Cards: VGA Res for EGA Monitors" (PC Magazine, December 22, 1987), we reviewed Tatung's Supreme EGA card and incorrectly called it the Omnicard. The accompanying photograph is also of the Supreme EGA card and not the Omnicard, as was stated. Unlike the Supreme EGA, Tatung's Omnicard does not cause flickering in 800 by 560 high-resolution mode.

Vault Corp., maker of the PROlok copy protection scheme, has satisfied creditors and is scheduled to emerge from Chapter 11 on January 14. In the article "Coping with Copy Protection" (PC Magazine, November 24, 1987), we erroneously reported that Ashton-Tate's removal of copy protection from its domestic software "led to a rapid decline in Vault's fortunes, and the company eventually filed for Chapter 11 protection." In fact, court records indicate Vault filed for Chapter 11 to protect itself from 3M Corp., which Vault was countersuing regarding 3M's lack of promotion of another Vault product, FILElok.

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10 BIG REASONS IT'S TIME YOU CHANGED YOUR EDITOR TO BRIEF

FUNDAMENTAL TRUTH. If you are a programmer, you use your editor more than any other tool. If it sm't the best, the fastest, the most versatile, the most productive, well, then neither are you!

OUR ENTHUSIASM. While we do not publish BRIEF we wash we did. We sell so many BRIEF shat we've been advertising it non-stop sizes it was introduced two years ago. We're not alone in our enthussiasm. There is no end of accolades from other admirters.

This Months Feature Attraction!! UNDO, NOT UNDELETE

Chances are you don't know how much of a lifesaver BRIET's Undo really is Perhaps the protesion of editors with an "Un Delete" capability has

lowered your expectations?

Bind has someting that the plethora of other educes do not have. A real Undo command that doesn't part recover your most record accidental deletion. It undoes all accidents for one undo any command that affects the custor or the text (for example, a global replaces). And leep undoing

up to 300 times, even basels to the beginning of your animon.

"High on the last of the editors distinguishing her larver as at Unito's capability that your insent the larver as at Unito's capability that you insent earliers. The capability offers much more than in earliers. The capability offers much more than in seators against muchaels, experienced users account animal common times and animal common about commands to the displace of a file with the share commands to the displace of a file with the quackly return the carrier to the engine found purchase the carrier to the engine for the carrier to the carrier to purchase the carrier to the engine for the carrier to the carrier to

WINDOWS ON THE WORLD, Wity the excrement? First, BRIEF's architec ture Any number of files of virtually any length can be open. (Start BRIEF with "*.*" to prove it.) Open as many tiled windows as fit the screen-over/under and side-by-side-to work on any of your files Open, close, and resize windows as you go. In each window, full screen or tany, all editing techniques are at hand-high-speed cursoring, paging up and down, horizontal scrolling, optional word wrap. Load the same file in any number of windows to view different areas simultaneously. A change in one changes all. Cut and paste text blocks between windows and files, or into buf fers for later recall. All files stay in memory, so you can always go back to sup some more.

TWINDO, NOT UN-DELETE, Don't confuse the two BRIDT deem't sat should you want to pack them up from the caturing room floor. It can reset the whole tim back ward undoing any command that affected the cursor or the text Watch it undo a global replace, for example. Undeany It can back up 300 times, all the way to the begruning of a ses son. "Works like a dream"; and The Coursal.

BEILL CAMES. Leave BRIEF, run
your compiler, prize out he error messiges, load up BRIEF again? No way!
Run your compiler from made BRIEF? It will
point to each error line in your source program, still loaded in memory, its runmcicate
edding. You don't have to leave BRIEF to use
DOS either. BRIEF disappears from the screen
BRIEF popt loads to the acres of all the
files you wrete working on.

nes you were working on.

**EY WRIZ. You can reassign BRIEF's command keyfuts to whate wer keys so you are used to, even your old editors, so you can used to, even your old editors, so you can used to, even your old editors, so you can be assigned to single keys. Cr you can tell BRIEF to listen while you tap out a compiler rottime. It will save and playback faithfully, a shortcut macro without a single lies of coding.

MULTI-LINGUAL, BRIEF's macro language is perfect for writing formation of their for your language which midden, match up parentheses and brackets, and set up statement templates for fill-in. BRIEF comes with C language support already built in Others have written macros to format Pascal, BASIC, LISP, Ptool, FORTRAD.

QUICKER PICKER UPPER. Lockprofer comethage? Bittle Pias fall UNIXlike expression search tools to forage and find and fix any file in memory. Jalenta strings with wildoards and "?" character masking, sure. But also indifference to case or intervening characters, Jeency to match all vowels, or [= seex] to match anything but vowels, [a.d.len] to match character ranges, beginning or end of line searches, even mitigate choice

10 REASONS 11 THROUGH 20: 11. BRIEF comes with a color option. You can select your own color scheme anytime. 12. It supports EOA's 43-line dBRIEF.
The Power
Environment for
dBASE Programming

Many worthy utury produces supply needs to dBASE's progressing language doesn'tdUTILITM dFLOWTM and a host of others Trouble is, you have to use them separately, then combine their output isto your dBASE program files

No larger dBRUETTM, written in BRUET's macrolanguage grabs bold of BRUET and earns it modered the state of BRUET and earns it mocromes. Using BRUET audietiying abell copubrines and no own interfaces, dBRUET can nuceonal utary becares, place dBRUET can nuceonal utary becares, place dBRUET can nuceonal utary becares, place dBRUET can full indeed and running the show it can do what BRUET altered you does place.

 Convert a screen layout into dBASE code for interactive data entry
 Diaplay dBASE file structures in windows.

a great convenience alongside your program files

• Expand keystrokes into full dBASE

Indent automatically for clegac display
 Create databases, index files, invoke Ashton fate is dFORMATTM and dCONVERTTM, draw lines and boxes

"Simply marvelous programming environment for writing and edining dBASE programs", PC Megazine, 7/86 Source code included: Requires BRIEF I 32 or later and 384k, 512k to run dBASE writin dBRIEF, 840k and harddisk

mode and can display up to 128 lines long

13. Full be A SCII deplay, the whole chasuport. 18. Command line start-up flags to modify suffers belower change a path name, or run suffers belower change a path name, or run suffers belower change a path name, or run and a word processor with verspround and manages setting. 18. Automate file awar during also moments. 11. Compatibility with most skylacity manages and setting and path of the works. 18. A buildent board with public domain amount contributed by a multiprocessing only of macromancers. 18. To copy protection. Tom the publisher.

WHOLLY MACROS. Much of BRIEF was written in its own macro lan guage It is that powerful! The language and its compiler come with every copy, as do many standard macros, with source code for learning by example it is a complete language with conditionals lcops, recursion, global and local variables even data types it can control files windows and the keyboard It has structure, 32-character variable names, and-not at all like 1-2-3" a cunedorm--us entirely readable, like a hybrid of LISP and C With it you can de

velop a library of routines to power BRIEF your way



NEW VERSION 2.0 I Support for more purposable to the multiple lines * Faster undo & expression search * Added hyses of blook marking * Optional borderiess windows * Supports displays with 127 lines, 255 Chars * New documentation with tubrials on regular expressions and macros-30 DAY money-back guarantee for products in resalable condition.

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LIBRARIES C source, assembler source, and benary libraries of 225 functions for pearsy sorranse of 225 functions for many completes Emphasises teath functional groupings to marinus leading code which your application may never use Manual's 250 pages help select functions, as do demos, belien board. A sampling DCS entensions for tile and directory manipulation. Screen, select mode, page, monochrome or color, natives, current shore, pageselect mode, page, monochrome or od or, palete, cursor shape, possioneng, clearing and scrolling; posel get and part Strages efficient operations to add, particularly strategies of speed. Other, craphics printitives, keyboard states, function key session-ment, time/date, read regulers, get memory sale, peek and poice Specify SV770 & Compiler Let \$188, Here \$139.

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BTRIEVE B-tree File

Manager Plus Add Ons If networks are on your horson, betting your future on Brieve as the one file man-ager for your C. Pascal, BASIC, and COBCL projects looks like a smart move Reason? Novell bought Btrieve's creator Btrieve sfunction library takes complete charge of all fue creation, indexing, read ing, writing, insertion, deletion, space recapture, forward and backward search ing. Its balanced-tree indexing scheme finds any key in a milion in four or less accesses Files may have up to 24 undexes. fixed record length to 4090 characters

variable length to 64k, indexes up to 255 characters, fues of 4 billion bytes Let \$245 Us \$195 Network Venson Let \$595 Ours Only \$465 And ask about Xineve for Brieve file inquiry, and Rimeve for percent writing. All three in versons for any network that supports the MS-DOS 3 I file sharing function

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Favorite Has Library Source There are no screen design and data entry tools quite like Panel Plus. With it you design a screen under program control anei's unity to "run" and test # field by field, then pass it to Pavel's code gen erator which delivers C source code to work with as you please. The code calls Panel Plus's function library, but now the library comes in source, so everything is ortable and changeable Has every imaginable feature. A screen can have 1000 fields stacked 127 levels deep. Each field can be based, multi-row word-wrapped scrolled four ways Issked to help mee sages, matched to a picture, validated after data entry - it's exhaustive

Operates in graphics mode via inter-faces of graphics products it supports Handles ECA's 43 line screen. Adaptable systems Major tool with years of evolu-tion Last \$466 Here \$365

Kernal for IBM RT

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specification is the program. A correct program can be achieved many times people and the bearing of the series of the 2D programs into a target language, per nutting easy interfacing with existing pro-

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around your application. Its full power
around your application is full power
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function call can set up a complete text
defor in a screen window Recently acquirsed by Solution System, over 800
pages of Documentation, Turto end
Quick C version and a complete Intenfines Library have been added or of. able chance buts to the screen restorant the background when distressed · Windowing facilities open portholes of up to acreen size for viewing virtual screens larger than the physical screen.
• Full context-sensitive help screen man agement takes over these chores and error messages. Automatic routines uner rupt with pageable text windows explain-ing what to do next

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Persistant of the process of the pro

C-WORTHY NEW YEARS

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Novell found it 'played e key role and accelerated development" in making its NerWare?M utilities easier for users. Ingenacus demo call for a Ask for C-Worthy Call with Forms Library

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Any number of Workwa may be

ined, each with a striking bordes and brillsart color. Define "pop-up screens, Save/Restore images, set Cursor shape. Share an entire acreen into a

Character array
The Keyboard, read it without echo. or sense any keypress during execution uzsor controlled directly with

Edit keys

DOS interface includes: Call System.
Call Exec. Findfrst/Findhext for (*) and
Of the searching Search the Path, submand line argument parsng, date/ten functions, DOS environment access, and much more. Other utilities also included Specify compile McFarland Let \$149.00 Us \$129.00

C-TREE & R-TREE B-Tree File Manager Now Has Report Generator

c-tree: The only major is tree file manager with network support in the standard is cost version in tree Disgress you record cost version of the individual policy in the control tooking routines for DCS 3 1/3 2. UNIX and XENIX and it even comes in C source code yet there are no royalities. Source sticks to K&R, so C tree is portable. Tests Permits any number of keys for a data ife alpha, numenc, even floating point Handles files with varied record lengths.

z-tree: Adds the ability to produce ad hoc reports from Nes mauramed by c-tree (v. 4.) and up). Link a file descrip-tion to the r-tree (M. library, and use any text editor to write report scripts with no further Clonding Reports can access data in several files select on criteria, jup findings into new logical records sort them, calculate new fields and columns tabulate by control breaks. Comes in

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WINDOWS for DATA M'Soft Windows Compatible Only one package can be easily recom

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mended' said Computer Language (June 87) reviewing noe window and disaertry products for C Complete field level func data type, screen location, picture larger variable entry rules help messages. Windows for Casa subset. No data entry scroll and highlight lists vertically and

for Deta Let \$295, Our: \$259, Windows for C Let \$195, Here \$149.

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You've probably seen the speed and today's top products pigazz and pana-

memory in as liffe as 1/10th second, and claims the fastest video output available Library has 50 business graphics functions, 40 strong handlers, 28 functions for printers. IB for mice, 11 for time and date DOS interface functions for disk error trap ping directory and file creation and ma-

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Who says you can't have it all?
APPLICATIONS PLUS has everything you need to get the most out of dBASE
An application generator (QUICKCODE
PLUS; relational report water (QUICKREPORT), and graphics system

and graphics system OUICKCODE PLUS offers domes of features you've never seen before in a dBASE code generator. Relational appli-

cations that read, display, and update a lozen or more databases simultaneously Real time" calculations, performed on Forms up to 11 screens long, with the ability to pass data between screens Computational formulas that automati cally combine data from different data ases 9 Data types 16 field types QUICKREPORT is a full-featured rela onal report writer, which combines up to 6 databases in one report, hand to-one relations, fancy printer features (like **bold** and states), computed fields.

GRAPH is a graphics system that produces bar, pie, line, and pieber charts directly from dBASE data. Dozens of opAPPLICATIONS PLUS 1



APPLICATIONS PLUS is 100% compa-tible with Clipper and FoxBASE* APPLICATIONS PLUS 54 QUICKCODE PLUS QUICKREPORT QUICKENTRY

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CLIPPER From Nantucket Compile dBASE for Speed, Protection

C lapper TM turns lumbering dBASE*
unto a speed dMON with benefits bing in its wake your source code is distribute your complet application with out royalties, and your customers don't even need copies of dBASE. The Spring 87 Clapper offers index files compatible with dBase III Plus, and networking capabéties to run compéed programs on

belp techniques for applications a de-bugger, and it supports Expanded Mem-ory. It goes well beyond dBASE with L024 fields per data base and 2,048 active memory variables Clipper has the power to save and re store multiple screens to and from men lays call object modules compiled in other languages, and create function libraries to link with your applications. Power and offers arrays menu-building commands flexibitry make a the "I dBASE compiler Lat \$665 PC Brand \$375



McMAX From Nantucket Like dBASE for the Macintosh

M cMaxTM is like nurring dBASE on the Macantoih it combines an east to use meau-criven ASSIST mode using the Mac interface, an interactive nand mode like dBASE at the dot prompt, and an application programming language applications on the Macint and transfer back and forth to the IBM® and transfer back and torth to the IBM* world. McMax accommodates up to [6 million records, 32,000 characters per to 32 files open concurrently No cop-protection Lett \$295. PC Brand Call

dBC Identical dBASE III Plus Files Using C

d BCTM is a series of C libraries from Lattice which creates, accesses and updates files identical to those of dBASE itself. So dBASE can read and update the

What for? It means both C and dBASE applications can operate on the name programmers can interface with the big market of dBASE users out these, yet ade-step the dBASE language. It means dBASE applications can now be linked to the universe of C libraries and tools to add windows, graphics, statistical analy ms. all the things dBASE cannot do. It means the speed and power of C to im press clients accustomed to dBASE! dBC's functions parallel all dBASE's file to permit direct data manipulation. Ten each of data, index, and memo files may be open at once. It's so complete an ISAM package that you can forget dBASE and use dBC only for C programming Our versions of dBC manic file formati for dBASE III and IIII and now dBASE III
Plus makes your peograms network
ready! as many statuors as a network
allows. Hands-off mode handles record

and file locking and unlocking automat-ically. Close in functions give you direct Supports all four memory models Specify compiler and dBASE version. For dBASE II III Let \$250 Ours \$195 For dBASE III Plus Let \$750 Ours \$596

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WALLSOFT'S THE UI PROGRAMMER

Code generator for dBASE The UI Programmer was developed for professional dBASE programmers who have been frustrated in the past by code

generators. Up until now a serious dBASE programmer had to take what ever code a generator produced and modify it to their needs. With UI the developer can generate exactly the dBASE code wanted UL (User Interface) has two main func

bons the first is a powerful forms editor to create sophisticated screen and menu forms in a matter of missions. The editor is completely menu-driven. It works on 'point-and-shoot' principle—just the curror where you want and tell UI what to run these. Uls other more important, main func tion is generating code for the forms

you've designed. Once you have a form "Generate" menu, and tell UI which tem plate you want to generate the code with That's the key-each template tells UI to produce a different kind of dBASE

It is through these templates that you can program the way UI generates source code. You can use the templates that come with UE "as is "(there are about 25 of them); completely sewrite them or write your own. So you don't lose control of design, like you do with other generators. You just let UI do the

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PC ADVISOR



Help in checking grammar and style on a PC, in adding a clock without taking a slot, in using the PC jr monitor as a CGA display, and in adding EGA to the AT&T 6300.

RIGHTING WRITING

I've seen advertisements for grammar checkers for the PC in your publication and others; I'm planning to break down and buy one. Which of these programs is the best?

Narecita T. Ibanez West Covina, California

Grammar and style checkers for the PC suffer from a well-deserved reputation for inadequacy. None of the packages we've tested has come close to catching all serious grammar errors, much less the finer points of style.

However, if you keep in mind their formidable limitations and don't take their word for everything, the better grammar checkers may improve your writing. They prove most useful as checkers of punctuation and capitalization and as aids to achieving a more straightforward style of writing.

Grammaik II (S89: Reference Software Inc., Walnut Creek, Calf.; (415) 947. 1000) and Punctuation and Syste (S125: 2004) Systems, Son Diego, Calf.; (619) when we rounded up grammar and style teckers over a year ago (**The Quest for Syste.** PC Magazine, May 27, 1986), sother puckage has changed since wining up honers. RightWiret, Version 2.0 (813) 923-9211, which also cannot respeciable marks, has grown to Version 2.1 and added several new yearnes.

Punctuation and Style earns high marks for punctuation checking, but the program lacks word processor support for some heavyweights such as WordPerfect. RightWriter offers the strongest arsenal against a poor writing style. Like Grammatik II, RightWriter generates a wealth of statistics you can use to monitor your style. For instance, it generates a readability index-the level of education needed by the reader to understand the document (the lower the grade level the better). But RightWriter goes a step further than Grammatik by flagging every passive sentence in your document. There are times. of course, when a passive sentence can and should be used. But a document full of passive sentences makes for a very boring document.

Whichever package you choose, remember not to take its suggestions as the linal word. Also realize that these programs are meant primarily for business writing and have little application to creative writine.

None of the package

 None of the packages we've tested has come close to catching all serious grammar errors, much less the finer points of style.

NO-SLOT CLOCK

I've somehow managed to fill all but one of the slots in my PC compatible without adding a clock. I want to add a clock but don't want it to occupy my only remaining slot. What are my ootions?

Linda Brandford San Francisco, California

You've got at least two attractive options. First, dClock II (\$69.95; Microsyne Inc., Carrollton, Tex.; (214) 788-5198) attaches to the back of your floppy disk drive in place of the controller ribbon cable. Your system's controller cable then attaches to the dClock II.

The SideClock (\$59.95; Innoventions Inc., Houston, Tex.; (713) 879-6226) takes a different approach. It installs around the base of a slot and fits contacts into the slot. But its design allows any oth-

er board to install in the slot as well. Either clock will work fine, but the dClock II takes top honors for its easy installation.

SALVAGING MONITOR IR

I have finally decided to give up on my PC/r after 2 years of gallant struggle. The one part of the /r that I really like is the color monitor. Is there any way I can adapt the nonstandard connector so that it can be used with a PC?

Edward A. MacMullan Santurce, Puerto Rico

Depending on when you bought your PCjr, your monitor is either the PCjr Color Display or IBM's standard Color Display (CGA monitor) with a special adapter for the PCfs. A label on the front of your monitor should identify the tuake. Either way you should lawe no problem using the monitor from your PCfs as a CGA monitor on the PC.

If you've got the IBM Color Display with the special adapter, all you need do is replace your existing cable with a standard 9-pin monitor cable.

If you've got an authentic PCir Color Display, you'll need au adapter to fit the monitor's 18-pin plug to the CGA's 9-pin councetor. PC Enterprises (Belmar, N.J.; (201) 280-0252 selfs usch a plug adapter for \$24.95. The Peanut Gallery (Troy, Mich.; (313) 585-6897) selfs a similar adapter for \$38.

MORE ON 6300 EGA

As a follow-up to last issue's advice on adding an EGA board to the AT&T 6300 (PC Advisor, PC Magazing, February 29,

■ If you've got an authentic PCjr Color Display, you'll need an adapter to fit the

monitor's 18-pin plug to the CGA's 9-pin connector.

1988), at least one manafacturer is marketing an EGA board designed to work with the nonstandard 400-line color monitors that AT&T ships with the 6300. The STB MaltiRes II (8349: STB Systems Inc., Richardson, Tex.; (214) 234-8750), which can also be used with EGA or multiscanning monitors, drives the 6300 multiscri all standard EGA modes. The board also provides 16-color, 640 by 400 display of Lotus 1-2-3. Microsoft Windows, and AutoCAD.

read server, sinted out here last issue, the base design of the 6300 btan to the 6300 btan to the 6300 btan to the 6300 btan base sproblems with some programs in Ed. Amodes. The Matilles II solves some of those problems. STB reports no problems running Microsoft Word on the 6300, for instance. But you can still expect problems with 6400 of the 6300, for instance. But you and EGA Paint.

ASK THE ADVISOR

Send your questions to the PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016. Please specify the equipment you are using.

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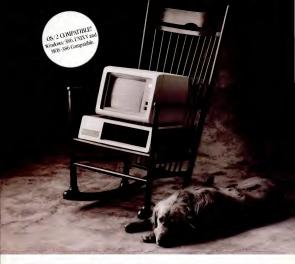
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FIRST LOOKS

Lucid 3D: A Spreadsheet That Pops Up , Links Cells



solves all the usual problems in most unusual ways. It doesn't bother with graphics or pretend to be a database, and it doesn't care much about Lotus standards, but it does some things nothing else does. First of all, you can run Lu-

cid as a TSR. This means you can pop it up over another program and use its clipboard to import and export text and numbers. Since it's meant to run



the highlighted cell (displayed in the 100 line) refers to a cell in the sheet above it. A mouse will make spreadsheet control easter, but it's not required.

while some other application hogs most of your RAM, it doesn't let you build very big spreadsheets-no more than about 60K each.

But this by no means limits Lucid to pint-sized applications. You can link spreadsheets together to build as hig a model as your disk will hold Summary worksheets can take key values from any number of subsidiary worksheets. When the numbers in the subsidiaries change, the numbers in the summary sheet change with them.

Since you can display as many as nine different spreadsheets on the screen, it's easy to (continues on page 34)

Cruisin' at 20 MHz: The ALR 386 Pulls Up Alongside the Big Boys



You say you loaded PageMaker and it brought your AT straight to its knees? And your latest Latus 1-2-3 macro took 4 hours and 25 minutes to run? And Microsoft Word took 15 minutes to repaginate a letter to your Mom? Is that what's troublin' you, Bunky?

Well, for once the answer isn't to run right out and get your hands on a Compaq Deskpro 386/20. Rather, it's to get

your hands on an ALR (Advanced Logic Research) Flex-Cache 20386, another new 20-MHz 80386-based screamer that leaves IBM's PS/2 Model 80-111 catching its breath at the starting line and consistently lays down a coating of dust on Compaq's IBM-basher. have to move it down the hall.

The FlexCache not only runs fast, it looks more like something Don Gartlits would drive than a computer. That's because the front of its sizeable 251/2- by 71/2- by 17-inch (not including its floor stand) all-steel case is decorated with matte black fins

that look for all the world like they were pried off a turbocharger's intercooler. The gobs of welded steel in the Flex-Cache's case make this model heavy enough (75 pounds) that even the Schwarzenegger types among you will sweat if you

But you won't want to move it. The FlexCache runs PC Labs processor benchmark tests at virtually the same impressive numbers the Compaq produces, and the ESDI-controlled

150MB disk installed on the (continues on page 35)

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SILVERADO Funny name; serious DBMS

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BY GUS VENDITTO Having trouble sifting through your back issues of PC Magazine for a particular review? Who isn't? We published more than 4,000 pages of reviews, opinions, and productivity tips last year, mixed in with thousands more advertising pages.

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ogies Group. The service, PC Reviews. lets you search for any keyword likely to point you to a product review, returning a 20- to 30word summary of the article and the issue in which it was published, whether it was PC Magazine or one of nine other computer publications, including

PC Week and PC Tech Journal. A search for "Model 80" returned 11 review summaries: "AST Premium" prompted four responses; and Fastback made five hits.

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Lucid 3D

(continued from page 33) see how the links work. You can build them by writing formulas that refer to external spreadsheets, or you can just "point" with the cursor from one sheet to another and link them automatically. The Plus key on the number pad moves you deeper into lower-level spreadsheets, and the Minus key takes you

stants, as well as the antecedents and dependents of any formula. Or if you've forgotten which cells are linked to other sheets, Lucid can highlight them on the screen or give you a quick list. You can also keep a careful record of spreadsheet logic by attaching notes and other text to any cell. Another maintenance tool is search-andreplace. It will hunt down either

labels or values, and let you re-

When you need to recale the whole sheet, Lucid first takes care of all the formulas on the current screen and then hands control back to you. You can then edit that screen, but even though the mode indicator says Ready, Lucid is still calculating. If you try to jump to the end of the spreadsheet, you may find you can't get there until Lucid finishes thinking. Lucid's keyboard interface

is no knockoff of Lotus 1-2-3 but is intuitive and well thought out. It has so many good built-in shortcuts that you won't feel hampered without a mouse. But if you have one. Lucid puts it to excellent use, especially in moving or resizing windows

and selecting ranges. Lucid builds macros mainly

by recording keystrokes. You even record conditional branching and subroutine calls by using an interesting system of menus. Only if you run a separate utility program can you do limited editing on the script itself. On balance, the macro language seems about as powerful as the one in Release IA of 1-2-3, with the added ability to drop out to DOS, run batch

files, and then return to Lucid. Lucid has not feared to stray a good ways from the Lotus standard. There are vast chunks of 1-2-3 it just left out: graphics, database management, string formulas, complex macro commands. It has fewer formula functions than 1-2-3 but uses a

clever technique to let you design your own. Its macros are not Lotus compatible, but a utility program converts spreadsheets back and forth. If the program runs into a 1-2-3 function it can't handle, it honestly puts the label Cannot Convert into

the cell. Though the vendor is very quick about fixing them, early versions of Lucid have had some bugs. For example, I hung the program by trying to print a big spreadsheet before it had finished recalculating. Also, most of Lucid's functions disanpeared when I completely filled its memory.

But the program was developed by the same small outfit that made such big waves with Lightning, the disk cache, and Breakthrough, the PC speedup board. Personal Computer Support Group says that it's firmly committed to sending out bug fixes to anyone who asks for them, and when all the initial problems are solved, a new disk will be mailed to everyone. In addition, although the initial release did not include a tutorial but offered one at a separate cost, the company is now including the tutorial at no cost and will send one to any Lucid owner who asks for it.

As soon as all the kinks are ironed out for good, Lucid will be a very appealing contender in the spreadsheet wars.



Lucid 3D enables you to track a spreadsheet's history with menu selections that show the roots and dependencies of any particular cell

back up toward the summary. There is no limit to the number of spreadsheet layers or to the

complexity of a model. A spreadsheet that stays resident and lets you link models is remarkable enough, but Lucid does plenty more. One of its hest features is built-in sudits that report unreferenced con- Very handy.

place them one at a time or all at

tor that pops up and talks directly to the spreadsheet. This means that you can pluck a number right out of a cell, work on it, and shoot the results

straight into a cell or formula.

Lucid has a built-in calcula-

FACT FILE

Lucid 3D Personal Comp Support Group 11035 Harry Hines Blvd., #206 Dallas, TX 75229 (800) 544-4699

List Price: \$99 until March 31. \$199 thereafter. Requires: 153K RAM (to run as TSR), one disk drive (hard disk

recommended), DOS 2.0 or In Short: A pop-up sprea that lets you link values from different sheets. Not copy

protected. CIRCLE 446 ON READER SERVICE CARD

FlexCache 20386 (continued from page 33)

unit tested here outperforms the 70MB disk in the Compaq, not to mention beating out the 115MB job in the IBM PS/2 Model 80-111. The processor's performance comes from the same configuration used by Compaq-a 32K static-column RAM cache controlled by an Intel 82385 cache controller fronting two MB of motherboardmounted 80-nanosecond DRAM memory with no wait

You can enhance the memory configuration using a pair of proprietary ALR memory boards that get mounted in specially reserved slots in the otherwise AT-compatible motherboard. Those two slots use a standard-looking 16-bit edge connector to achieve 32-bit data movement through a pair of boards by using an interleaving technique A standard memory board won't do anything in these custom slots. The Flex-Cache also supports an 80387

coprocessor running at 20 MHz. ALR also supplies you with Phoenix Technology's Control 386 performance package, and if you use it to remap the EGA



The 75-pound ALR FlexCache 20386 chassis has room for two full-height and three half-height disk drives. There are eight expansion slots.

BIOS into the 80386's 32-bit memory, a plain-Jane EGA in the FlexCache comes very close to the speed of Compaq's 16-bit VGA. Remapping the system BIOS vields equally impressive results. Unfortunately, the Phoenix software uses the 386's

protected mode so you won't be able to run Microsoft Win-

dows/386 at the same time. ALR is positioning the Flex-

an enormous amount of disk drive space that allows for up to two full-height hard disk drives and up to three half-height disk drives. The system can be ordered with either a 100MB a 150MB, or a 300MB hard disk, and the ESDI controller can

Cache as a network server or

high-end workstation for power

users. To meet those goals, it

has equipped the computer with

support up to two of them. As an alternative, one of the smaller disk drive bays could be used for a tape backup unit or a removable cartridge drive.

Whatever disk configuration you choose, the ALR Flex-Cache 20386 looks like it supplies the kind of serious computing power that can make good use of it.



ALR FlexCache 20386 Advanced Logic Research Inc. 10 Chrysler Irvine, CA 92718 (714) 581-6770 List Price: \$7,495 In Short: Even Compaq's Deskpro 386/20 eats the dust made by the ALR FlexCache 20386 as it screams down the DOS highway at 20 MHz embedded in a 32K static-RAM cache. 2MB of zero-wait-state memory, and a 150MB ESDIcontrolled high-performance dist

CIRCLE 449 ON READER SERVICE CARD



e ALR FlexCache 20386's combination of an Intel 82385 cache contri with a 20-MHz 386 processor helps it to match the Compaq Deskpro 386/20 raw computing performance; the big surprise is the blazing speed of the ALR CDC hard disk.

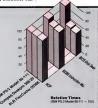
Performence Times (Times given in seconds except where noted)

	NOP	80386 instruction Mix	Disk Seek (millisecon
IBM PS/2 Model 80-111	1.7	3.2	32.7
Compaq Deskpro 386/20	1.7	2.9	18.5
ALR FlexCache 20386	1.7	2.9	17.5

The NOP benchmark test is designed to measure raw schine code instruction in a hig 128K loop

The 80386 Instruction Mix benchmark test measures the time it takes to execute a selected series of proces sor-intensive tasks. The test program uses 80386 inintal processor instruction set. The 80386 instruction Mix Implements a number of 32-bit operations. In the 80386 sessor these become single instructions, whereas it the 8086 and 80286 versions of the benchmark test they

The BIOS Disk Seek benchmark test measures the br pass time. The test program performs 1,000 seeks. The marrow result is shown in militarcoards



Silverado: An Innovative Add-in Relational DBMS for Lotus 1-2-3



BY MERV ADRIAN Some people just don't want to leave their comfortable environment and learn a new interface every time a new product comes along. That's nothing new; witness Microsoft's effort to create a "compatibility box" in OS/2 for old DOS applications in a multitasking environment. The success of Lotus 1-2-3 add-ins to date has not been spectacular, but it's been substantial enough to prompt Computer Associates, itself a major spreadsheet player, to have Eric Michaelman, the author of Reflex, develop a database add-in product and release the 1-2-3 version

before the SuperCalc edition Ioin in Three Flavors

was ready.

Silverado is indeed an impressive product, with remarkable powers for data manipulation and analysis. It has a nice relational interface design, using the relational terms Select (for record selection), Project (for field selection), and Join, In fact. Joins are possible in three flavors: creating a record for every record in the Primary database from the first matching record in the Lookup database; creating these records from a Summary of the records in the Lookup database; or creating a record for every match in the Lookup database (a one-tomany Join).

In addition to its attractive tabular presentation of the data, Silverado also has a forms view for record-at-a-time viewing and a well-designed Search function to let you get at the records you need with easy. menu-driven criterion specification

Unlike many add-in products Silverado imports 1-2-3 data into its own files instead of working directly with the open spreadsheet: when you start to work with a Silverado database.

you are creating a new file. Of 1 course this is redundant storage, but more important are the integrity issues. Silverado maintains integrity in its databases. but there is no live link back to

the spreadsheet it was spawned from, raising the possibility that your database and your worksheet can quickly get out of sync. You can link them, but once you save your file to disk. it's closed and therefore unavailable to 1-2-3. When a remands invoke add-ins, and there's an equivalence table that maps 1-2-3 function keys to Silverado function keys to help you do this. Virtual memory is supported as well.

Database Outlines

The reporting functions are

perhaps the most impressive feature of all, and the ones most likely to be of use to analysts. Creating reports is menu driven and quite simple; there's a calc is done in 1-2-3, the Silver-Quick report option that will of-

ten get it right with minimal

specification on the user's part.

Database Outlining, a marvel-

ous new approach to on-line

analysis, really takes the cake

here. If you create a report at a

certain level of summary detail.

you can expand or contract that

level of detail with a keystroke.

ample before you're shown how to add them), but the interface is

A Crosstab view is one of several forms that Silversdo con use to display a Lotus 1-2-3 database. If Silvarado reminds you of Borland International's Reflex, that's because the designer was also one of the original programmers behind Reflex.

ado links will result in ERRs within the spreadsheet until you bring. Silverado up and let the links do their job. This is not too much trouble, but it would be far better if Silverado were smart enough to open and update the needed file automatically. Still, this is Version 1.

You can import from dBASE files, and there are a number of @ functions for data exchange with 1-2-3 in both directions. (This is how the links referred to above are implemented, but you can use them yourself as well.) You can set range checks for automatic checking of input

you'll find a brief discussion of

how the 1-2-3 {APPn} com-

much as you would in Think-Tank or some other word processing outline package. This lets you zero in on significant elements as needed, requesting more levels as they become important to you. There are a few problems here and there. The tutorial data and even use I of us macros lacks continuity (new fields ap-In the generally good manual pear in the discussion of the exFACT Silverado

Computer Associates Inc. 2195 Fortune Dr San Jose, CA 95131-1820 (408) 432-1727 List Price: \$149 Requires: 512K RAM: Louis 1-2-3, Release 2.0 or 2.01; two disk drives: DOS 2.0 or later. In Short: A very attractive 1-2-3 add-in for data management with a powerful but simple menu-driven interface and many impressive features. Not copy protected. CIRCLE 450 ON READER SERVICE CARE

intuitive enough that the learning process should not be difficult. The Ins key, which is supposed to allow you to insert fields, does so only at certain points, and it can be confusing when it simply doesn't work. Again, things are intuitive enough that you will likely find the answer quickly.

Stores Sorts

Hiding a field is accomplished by pressing the Del key. which I found totally counterintuitive. Showing it again requires a rather elaborate set of keystrokes: insert a blank field. cursor on a field name "where a field name exists," press Ins (an empty column appears), press F10, and select the name you want from the list of fields that

Another quirk is the command syntax. When performing a Sort, you execute a Specify-Sort command. Then you have to Ouit to back up to the point where you can then Perform the Sort. Why not stay with the conventional Go, used elsewhere in Silverado? The author explains that Sort instructions are stored for the next query and that this is the trade-off needed to implement that feature.

Still, these are relatively minor quibbles, and Silverado is definitely worth looking at if you're interested in making more use of information already stored in spreadsheets.

How to Get More From Your Softwa



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Today's PC software is more powerful than ever. But, with that power often comes added complexity. Now, there's an easy and inexpensive way to increase your productivity and get more from your software. PC-DocuMate keyboard templates from SMA provide a simple command reference that allows you to use your software faster and with more confidence.

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\$199 Felix Chases the Mouse: **Uses Hot Spots to Store Macros**



BY TOM STANTON In the beginning there was the light pen, which begat the puck; it begat the joystick, which begat the trackball. Then the Palo Alto Research Facility turned the trackhall over and begat the mouse, which multiplied buttons and was good. And now Lightgate brings us Felix PC200, an optical pointing device that replaces the rolling trackball with both a sliding plate and a button. What hath Lightgate wrought?

One-Button System

Actually, Felix is a fairly clever system that combines optical technology with a unique single-button system. The Felix pad measures 51/2 inches square and plues into a standard serial port on the computer. Many programs can be run directly simply by typing FELIX and the application name. Felix software emulates the Microsoft Bus Mouse in absolute mode, so you can substitute Felix MOUSE.COM for Microsoft's with any application. You must add Felix drivers to your Windows setup disk and install it again to add Felix to the list of pointing devices.

Felix uses a sliding plate that



mans absolute screen regions at 300 dots per inch. When you slide a button to a corner on the plate, the cursor moves to the same corner on the screen. You don't move more than 11/2 inches to cover an entire screen, which climinates "hopping across the desk with a mouse or energetic trackball rolling, but it's an acquired taste. I'm used to shoving a mouse around, and Felix's tiny pad had the cursor flying around in Ventura Publisher until I learned to settle down.

The button system is even more unusual. Felix uses a single button to move the plate. By sliding to one of three regions, or "hot spots," on the edge of the plate and clicking the button. Felix can emulate one-. two-, or three-button mice as needed. This also took some getting used to as I discovered in PC Paintbrush. At first I thought the system was impos-

sible to use, but Felix stores your cursor position while you activate the virtual button. With some practice I found it fairly easy to use, but it does require at least twice as many operations as a mouse. Old habits die hard. and Felix did not make it any easier.

Macros The button mapping makes

more sense when you start using macros. Lightgate has passed over the traditional menu systems that come with most mice and instead uses 12 regions on the plate that can be mapped to user-defined macros. By combining the regions with Shift, Ctrl, and Alt keys, you can map up to 60 macros for each application. The macro editor software lets you point to the region, define key combinations. and record keystrokes. The

FACT

Felix PC200 Lightgate 6300 Telegraph Ave. Oakland, CA 94609 (415) 653-8500

List Price: \$199 Requires: 25-pin or 9-pin serial pon: CGA, EGA, or Hercules Graphics Card.

In Short: An unusual input device that offers 300-dra resolution and button-keyboard macros. The button arrangement. using a single button combined with regional activation, creates more motion than it saves. Creative, clever, but no better than

other existing devices. CIRCLE 431 ON READER SERVICE CARD macros eliminate pop-up

menus, but you may need a cheat sheet to show all the possible button maps that you have created. In particular, Felix macros

seem ideally suited to applications that are not inherently mouse driven. For example, the Lotus 1-2-3 navigator files nut several functions on hot spots: a Learn mode for recording (which can be called only by rubbing on a Felix hot spot), a table of cell references for your worksheet that can be used to immediately access a distant cell, and a history of the last few spreadsheet edits. (Early copies of Felix shipped without these files; contact Lightgate if you didn't receive them with a purchase)

Mice Will Survive

Felix will be most appreciated on desktops where desk space is at a premium. Veteran mouse users may question the button emulation. There is quite a lot of motion involved, albeit minimum distance, when you emulate either a two- or threebutton mouse. Careful use of macros may convert some mousers but Felix will not kill off the mouse. Like so many other pointing devices, it will just take its place behind the ubiquitous rodents.





For high speed, high performance data integration, look into Magic Mirror.

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typing the

information

vourself at a

blinding speed.

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Now you can move data instantly from one program to another — right from your PC screen. Now you can transfer parts

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nely, accurately, and ellowlessly Without Magic Mirror, it's impossible.

It's the complete do-it-vourself data integration tool. The secret behind Magic Mirror is its ability

to automatically edit and reformat data while it's transferring. That's significant because the way one program displays information is usually not the way another program will accept it. No problem.

Select a few simple options, and Magic Mirror removes dollar signs, inserts carriage returns and other control characters, strips out spaces whatever it takes to make once incompatible

data look and act just like it was entered for the program you're sending it to

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Here's what people are saying about Magic Mirror. "Just received the program and was able to install and use it in a matter of a

- John Snyder, McNaughton Bapess Church, Akron, Ohio "Fantastic! ... probably paid for itself yesterday PM (I received it about

noon yesterday) in putting together a report by moving analyses from 1-2-3 to WondPerfect. Not only time, but accuracy since I'm not the greatest typist."

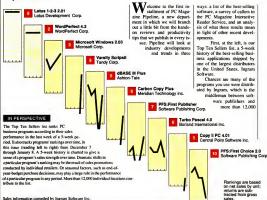
– B.T. Ellis, P.E. Brimmylam, Alchama

"A RAM-resident gem that accomplishes what I heretofore believed was impossible: [integrating] data between virtually any two programs."

—Jack Stone, PhD, Government Computer News

PIPELINE

Top Ten Sellers



vehicle combined with a cellular phone.



SURVEY

The survey was posted on the 44-line PC Magazine Interactive Reader Service. Callers were encouraged to leave comments, and we learned as much from these as we did from the tallies charted at right. One surprise was how many people said that the portable or lanton was their sole machine. A few of these were college students. but many worked in offices and liked to take their machines with them but didn't want the bother of maintaining more than one PC. One fellow didn't have a choice; he used a laptop "while on submarine patrols." Another used his "in a hazardous materials

When we tried to make people single out one important feature that a portable must have, most cooperated, but many refused to be pinned down, "All of the above-especially power!!!!" was a typical response. One asked for "everything but size and weight."

Next time, readers will sound off on software documentation

What do you use, or plan to use, a portable computer for?



Working in off-site locations Sharing with several workers at location While commuting between home and office

Other

PC MAGAZINE . MARCH 15, 1988

outlets. Those outlets include small independent stores, as well as branches of the major national chains, like ComputerLand, Micro Age, Entre, and Egghead. Nearly half of the outlets are value-added resellers (VARs) and consultants. Many publishers report that Ingram's network dispenses more of their software products than any other source. Virtually every single program for the IBM PC is carried, including games and personal growth programs.

We're screening out After Hours--type programs from this list, but we'll look at them from time to time. We'll also take a look at hardware sales and some specific categories of products in future editions. And in true PC Magazine tradition, we'll try to come up with a few innovative ways to analyze the figures.

Our list, by the way, is the result of a PC Magazine internal pipeline created by our art department. Numbers are tracked in a spreadsheet (Microsoft Excel at first, and then exported into Lotus 1-2-3); the tallies, in .DIF files, are entered into a BASIC program that, in turn, generates a Post-Script file that we print here on

WAITING IN THE WINGS

Big sellers that dish't make it into the Top Ten this issue include several combatants in the red-hot spreadsheet wars. Borland's Quature sold very well during the first 4 weeks-climbing to hold the number-3 spot for 3 weeks running-but in the fifth week it wasn't even in the top 20. Microsoft Exce' has been building strength, surely benefiting from the steadily storng sales of its

operating mate, Microsoft Windows.

And starting out life in a privileged position is Surpass, which was announced in the fall but shipped only in January (see First Looks, page 34, PC Magazine, February 29, 1988). It en

an Apple LaserWriter printer and eventually send to a typesetter's Linotronic 300. We're tracking 5 weeks to

week of shipment as the number-18 seller.

help put the top-selling programs in perspective and to look at trends. After all, we're not doing this to feed the competitive spirit (there's enough of that around already). Our goal is to create a forum that will help smart software shoppers better understand the maxket forces that are at work. You may not own any of the current Top Ten programs, but we thinky you'll find it valuable

will not p smart solure a noppers better understand the market forces that are at work. You may not own any of the current Top Ten programs, but we think you! If find it valuable to know what's selling. Maybe it will help explain why you're having a hard time finding office help who know your standard word processor. Or maybe it will help overcome

your fear of new products. But mostly, we think that the overall trends will point the way to the 'uture. Any bets on when the .irst OS/2 application will make its way into the chart? Or should we say "if"?

Out of Nowhere

Of course, some trends have to be put in context. For example, in this week's list, Tandy's revamped word processor, Varsity Seripsit, came out of nowhere to gain the number 4 spot. The overhaul of this classic was released only last month. It's a good program for personal use, but the fact that it's now outselling top corporate standards like Microsoft Word. PFS: Professional Write, and WordSur 2000

Plus (all of which didn't make the Top Ten this time, but have in the past jis probably a result of the season: these sales took place during the winter semester's back-to-school buying season. And that's a good time to be introducing a program perfect for college students.

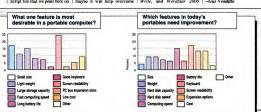
Survey Says... The next Pipeline piece (be-

low) calls on PC Magazine readers to vote on current issues. This time, we polled you on portables. Over 1,200 callers to the Interactive Reader Service responded, and 59 percent said they now own or plan to purchase a portable computer. Their votes are tallied below.

More to Come

The final piece of the Pipeline is the analysis that will appear in this space. We didn't have enough room in this installment to bring you the kinds of facts and opinions you'll be seeing here in coming issues, but we plan to bring you even more news of product developments, forecasts of trends, and

a behind-the-scenes look at how the future is taking shape. -Gus Venditto





When you need to move quickly among programs and files, Software Carousel carries the load for you.

Why get dragged down by that old PC technology?

Despite the sophistication of today's PCs, there's one thing they still don't do. And that's work the way people work. lumping from one task to another - from budgets to memos to phone calls and back.

So every time you need to change programs - or just look at another file - it's the same old, tiresome routine - saving, exiting, loading, retrieving. Not very convenient. Not very human. Now you could wait for the "next generation" of computers. Or use Software Carousel, and get the speed and convenience you need today, with the software, and computer, you already own. Here's how to make Software Carousel work for you.

Software Carousel is the amazingly easy way to switch almost instantly from Word-Perfect to 1-2-3 to dBASE to DOS to whatever else you want. Or go from one file to another in the same program. All without saving or retrieving - or wasting a precious moment of your time. Or your computer's memory.

It works by creating a number of independent software slots to load your programs into. You get up to ten of these software

slots, so you can load up to ten programs. Need to crunch numbers? Hit a key and there's your spreadsheet. Need your word processor? Don't bother saving your spreadsheet file. Just whip over to your document and do your work. Snap back to your spreadsheet and it's just like you left it. It's like all your programs are "pop-ups," just a hotkey

Or load the same program into a few different slots, each with a different file. Now go from one to another in an instant. Here's the best part of all.

You may have heard about some other "environment" programs that claim to do something similar to Software Carousel. But there are several important differences. First, they make you split your memory

up among the programs you want to use. Software Carousel lets you use all available memory in each and every program. It even supports expanded and extended memory. Other environment programs work with only some software. Software Carousel

works with everything. Period. It even resolves conflicts among memory resident

Other software creates a working environment that's complex, unfamiliar, with cramped little windows and strange commands. Software Carousel takes minutes to set-up just the way you want it. All your software looks and acts exactly as it always did. It's so downright useful, even IBM®

recommends it. Even as you read this page, there are tens of thousands of Software Carousel users zip-ping through their work without laborious and repetitive commands. And without the usual 640K limit imposed by DOS. In fact, even IBM recommends Software Carousel for use with their most popular mainframe-

to-PC communications package. We think you'll agree, that with this kind of speed, convenience, and nextgeneration performance, \$79.95 is a small price to pa

Look for Software Carousel at software dealers everywhere. Or order direct from SoftLogic Solutions by calling us toll-free. If, after thirty days, you're not satisfied that Software Carousel is the right way to get that old PC technology off your back, we'll gladly arrange for a refund of your purchase price.

Here's what people are saying about Software Carousel: "Can't believe how well it works. Who needs 80386!"

-Ralph Evans, Attorney, Fullerton, CA

"Unlike other attempts (e.g. MS Windows, DesqView) yours works, is not fragile and does not intrude its "personality" on everything that we do."

-Colm Ralph, Ralph & Panzer, Inc., Seattle, WA

"Fantastic program, Great book, Saves me an hour a day! Thanks." - Larry Pearsal, Rolling Hills Covernors Church, Rolling Hills Essates, CA.

"Solved all my problems with resident software." -Walter Afforentt, West Islap, NY



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MathCAD Adds Nonlinear Problem Solving



HANDS ON

BY BARRY SIMON Version 1.x of MathCAD was based on a lovely idea; by running the program in graphics mode, you can have a scientific supercalculator with mixed text, equations that update as you change values, and graphs on the same screen. It has a long list of built-in functions-not only the standard trigonometric and hyperbolic functions but Bessel functions and even a fast Fourier transform. But to a working scientist, it's limited-it can compute, but it can't solve, and its programmability is restricted, especially in comparison with powerhouses like

TK! Solver Plus. Version 2.0 has addressed the inability to solve in a big way! It can find real and complex roots of a single function with its Roots command. The real workhorse is the Find command, which lets you place several simultaneous nonlinear equations in several unknowns between the keywords Given and Find, then gives you the solution. In one step. MathCAD has added all the functionality what less speed and fewer bells | and whistles in this one area. There are restrictions-both programs had difficulty with the simple sample equation sets I tried once there were more than about ten variables

The other big new feature of Version 2.0 is full support for vectors and matrices. This gives new power to the one language element that MathCAD has, al-

though the limited programmability remains the new version's most serious lack

There are smaller additions: a built-in gamma function, a

few more Greek letters (but why not the whole set, MathSoft?), and a number of new printers and one plotter (only IBM Graphics and HP LaserJets were supported in Version 1.1).

Two things make MathCAD stand out among programs of this type. First, the graphic representation of text; other programs show you equations like $a^2 + b^2 = c^2$ on the screen, while MathCAD can have true

superscripts for powers. Second, it doesn't sacrifice ease for power. Potent supercalculators tend to be difficult to

FACT

MathCAD, Version 2.0 MathSoft Inc I Kendall Sq. Cambridge, MA 02139 (800) 628-4223

List Price: \$349 Requires: 512K RAM, one disk drive, graphics adapter (CGA, EGA, Hercules, AT&T 6300, or Toshiba 3100), DOS

In Short: A superb scratch pad for those who use equations. CIRC: U 448 ON READER SERVICE CARD

learn and use. MathCAD is among the most powerful but also among the easiest to use.

While MathCAD is well done, it does have its faults. The most serious is speed: I hardly noticed this problem on a 386 machine with a math coprocessor but found, it annoying on an 8-MHz 8086-based laptop without coprocessor.

If you deal with equations and don't need programmability, MathCAD is for you.



Irwin Drives Install in PCs and PS/2s



HANDS ON BY MITT JONES

Irwin Magnetic Systems has probably put more tape units on PC users' desks than has any other manufacturer. Now Irwin is betting that its formula for success-low cost, solid performance, and ease of use-will

win the PS/2 market as well. Rather than offer specific models for PS/2 systems, Irwin is now offering its popular 100 and 200 series units with hardware kits that allow installation in the PS/2 models. While this approach undoubtedly streamlines Irwin's production operation, it makes for an installation that's difficult at best and toolthrowing frustrating at worst, depending on the size and agility of your fingers

We installed our evaluation unit-a 40MB Irwin 245 unit that uses the pocket-sized DC2000 cartridges-into a Model 60. The 38 installation steps required that we remove the back plates and floppy disk drive cables from both floppy bays, install an Irwin-designed back plate into the lower bay. and reinstall the IBM back plate

and cables for drive A: Once up and running, the Irwin 245 performs within the range you'd expect from a DC2000 unit, tape drives known more for economy than speed. The 245 required 61/4 minutes to back up our IOMB test file. The Mountain TD4440 (see First Looks, page 35, PC Magazine, September 29, 1987) performed the same test

in 51/2 minutes. Irwin's E:Tape software packs reels of power in an easyto-master package. E:Tape supports NETBIOS-compatible and Novell networks, and casyto-use batch files or menus let you back up only certain files, only files that have changed, or only files that have been created or modified since a specified FACT

Irwin 245 Irwin Magnetic Systems Inc 2101 Commonwealth Blvd. Ann Arbor, MI 48105

(800) BACKUPI List Price: \$645; individual

kits for Models 50, 60, and 80, \$50 each In Short: A DC2000 tape back-

up system that uses a proprietary format to store up to 40MB per carridge CIRCLE 447 ON READER SERVICE CAR

lets you schedule your backups to run automatically on the days date. E:Start, a separate utility, and at the times you specify.



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The HP DeskJet: Crisp Ink Jet Printing for \$995 Plus Options

PC HANDS ON

BY IONATHAN MATZKIN Hewlett-Packard Co. would like its new ink jet printer to be the working man's LaserJet-a \$995 alternative that gives almost as much bang for many fewer bucks. And the HP Desk-Jet comes close on a number of counts. It produces gorgeous text output, generates 300-dotper-inch graphics, and accepts a wide variety of font cartridges. Add whisper-quiet operation to the list, and you've got a printer that looks pretty impressive right out of the box

Unfortunately, the DeskJet has a number of very unlaserlike qualities to go with its powerful features. It's not terribly fast, and it's not fully LaserJet compatible. Worst of all, perhaps, the \$995 list price is unrealistic when you consider the many features that should be standard but aren't. By the time you finish adding the options that you want, the actual cost of the DeskJet is up there with the

My first reaction to the DeskJet's print quality bordered on disbelief. It may be an ink jet, but it takes a hard, close look to distinguish its output from laser-printed characters. The plain-paper print is smooth. dark, and well formed. The quality is certainly high enough for reports that aim to impress.

Watching the printhead whiz back and forth suggests that the DeskJet produces its outstanding text at a very healthy clip. That impression, however, is not borne out by our benchmark tests, which rate the DeskJet printer at a disappointing 80 characters per second in draft mode and 64 cps in letter-quality mode. The disparity between



The \$995 HP Desklet printer generates very sharp text output, 300-dosper-inch graphics, and accepts a wide areast. ment of font cortridges.

The default print is letter quality, and even the draft output is better than the best print some midpriced dot matrix mathese results and HP's claimed speeds of 240 cps and 120 cps can be attributed to the Desk. Jet's paper-handling habits. HP's speed figures are for a burst of characters, generalized

to overall performance. Our tests rate performance over several pages, and it is between sheets, rather than within individual pages, where the DeskJet loses speed. After printing a page, the DeskJet suspends the page for a few seconds over its output tray-in order to allow the ink to drybefore loading another page from the built-in cut-sheet feeder. These pauses cut down dramatically on throughput.

The DeskJet also stumbles in its lack of compatibility. It runs with LaserJet printer drivers. but those drivers won't let it print any output that mixes graphics and text on the same page.

That's because the LaserJet is a page printer-it downloads and prints a page at a timewhile the DeskJet is a line printer, which processes output a line at a time.

I generated a good-looking graph with Lotus 1-2-3's Laser-Jet driver, but you are likely to run into trouble with a number of other applications. In the DeskJet's manual, HP lists packages-including Lotus's Freelance, Software Publishing's Harvard Graphics, and Ashton-Tate's Chart-Master-with which the DeskJet can use LaserJet drivers for basic feature support.

HP also supplies a floppy disk with a set of drivers custom designed for the Desklet and Framework, Symphony, 1-2-3, Microsoft Word, WordPerfect. and WordStar 2000. Other drivers are available by mail. And as HP points out, software vendors will probably write drivers to use the DeskJet with their products. The company claims that more than 60 software packages supported the DeskJet directly at the time of the printer's intro-

HP does not supply Epson compatibility as a standard feature: you have to buy an optional \$75 emulation cartridge.

The printer's standard buffer is a modest 16K, and sufficient add-on memory to allow downloadable fonts will set you back another \$150

Font cartridges range in price from \$75 to \$125, which isn't outrageous, except that you are forced to buy them in order to get certain very basic features. The standard Courier font lacks proportional spacing, italic type, and elite pitch. The font cartridges are neither hardware nor software compatible with their LaserJet counterparts. None of the cartridges provide both fixed pitch and proportion-

al spacing. The HP DeskJet has great potential, provided that the drivers it needs become routinely available. It would be more attractive if HP had elected to include more of its features as standard equipment.

List Price: HP DeskJet, \$995. Inquiries Manager, Hewlett-Packard Co., 1820 Embarcadero Rd., Palo Alto, CA 94303; call the tocal Hewlett-Packard Co. sales

office that is tisted in the telephone directory. CIRCLE 445 ON READER SERVICE CARD

HP Desk.let

Optional Graphics Support

Type: Ink jet

SPEED (cps):

Rated: 38

Tosted: e60

Carriage width: 9.5 in. Price: \$995

others optional

SOUND LEVEL (decibels):

TYPE PITCHES: 10, 16.67, 20;

Our constitution is in operation; everything to promise that it wil but in this world noth ertain but death and t Draft Bold Underline Co Elite Bold Underline Co Proportional Bold Underline C

chines can muster.

Printing: Bold, correspondence

quality, underline, sub superscript, italic (optional) Formatting: Proportional spacing, ustried lines, vanable form enoth, horizontal tabs, vertical tabs, variable line height, double-height letters

IBM character set: Low and high Graphics: Epson FX-80 (optional) Text: HP LaserJet. Epson FX-80 (ontional)

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Do you have to manually manipulate rows into meaningful groups? Is recalculation time for seldom

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With simple extensions to existing Lotus menus, ORACLE for 1-2-3 lets you create new database tables right from rows and columns in your readsheet. When you query the database from a cell, you immediately see current database information Update a spreadsheet cell, and the

ATHRUTY - PORTABILITY - CONNECTABILITY

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always wanted

always had, with the power you've THE ADVANTAGES OF DATABASE TECHNOLOGY If your data is in a database, your

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data management standard. · UPDATE YOUR DATABASE AS YOU UPDATE SPREADSHEET CELLS. In update mode, changes in your spreadsheet become changes in your database. And if you make a mistake, you can...

. COMMIT OR UNDO CHANGES. Finally, an "UNDO" command for 1-2-3! When your database change are complete, you can COMMIT them, or ROLLBACK your database and your spreadsheet

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Credit Card Number	Card Expired un Date	
Signature	PCMAG	

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New Font Editors from SoftCraft and ZSoft Bring More Power to Your Laser Printer

PG HANDS ON

BY EDWARD MENDELSON
A font editor gives you the power over a laser printer that a programmer has over a computer. You can create logos or special characters and symbols. You can modify existing soft fonts or make computerized versions of printed type. With time and skill you can invest a whole family of typefaces or design fonts for any language.

timesaving features.

PTF handles bit-mapped fonts (like Hewlett-Packard's) and outline fonts (like Post-Script's) and can convert between the two formats. PTF's bit-map editor is designed mostly for cleaning up or modifying existing fonts, but the outline

The part of the pa

The pound sterling character was imported from Publisher's Type Foundry's bit-map editor to the oseline editor, then reshaped, and slamed using the "gadget box."

editor has all the tools needed for both creating and modifying outline fonts. SCFE handles only bit-map

fonts, but it includes all the tools you need for centain new fonts and logos. It comes with the National Bureau of Standards' database of 1,500 basic characters. SCFE lets you work on as many as five characters at one time, and you can see enlarged and reduced views of the same character at once. SCFE has a Microsoft Window-like interface but runs alone, and you can

manage without a mouse. Both programs let you import logos or characters from images captured with a scanner into graphics programs like ZSoft's PC Paintbrush (which

Zsott s PC Faintwist which comes packaged with PTF). SCFE directly imports Hewlett-Packard fonts. PTF uses conversion programs to access. HP and PostScript formats. PTF creates screen fonts for Ventura Publisher that match the printer fonts. Neither creates screen fonts for Windows, but SoftCraft's WSFforts! to be re-

fonts for Windows, but Soft-Craft's WYSIfonts! (to be reviewed later) converts bit-map printer fonts into Windows or Ventura screen fonts. PTF dazzles with its ingenu-

ity. In the bit-map and outline editor, you can click on tools in a "gadget box," that let you rotate, expand, flip, twist, squeeze, or extend all or part of a character. A polygon tool lets you create any irregular area with a few jumps of the mouse. A special window lets you scroll through all the characters in a font and click on the one you want to edit.

PTF's outline editor provides tools to draw curves and
manipulate lines and angles.
The outline editor works like a
corkboard on which you construct outlines by stretching
threads between pins. Yet it's
easier to move the "pins" in
PTF than on a corkboard.

SCFE gives you tools in the bit-map editor that PTF offers only in the outline editor. You can automatically draw circles, ellipses, and smooth curves. SCFE also lets you transform standard fonts into boldface or white-on-black. With its five windows open at once, SCFE makes it easier to combine characters from the same font or even from different fonts.

Which should you choose? If you work with outline fonts, 2Solf's PIF's the only choice, and it has tools for modifying bit-maps. It also lets you use the graphics resources of Windows. But for serious typographic work in creating and redesigning bit-map fonts, SoftCraft's SCFE has the edge.



Publisher's Type Foundry
ZSoft Corp.
450 Franklin Rd., #100
Marietta, GA 30067
(4004) 428-9008
List Price: \$495
Requires: Microsoft Windows
and a pointing device. 640K
RAM and EGA/VGA color
graphics recommended.
In Short: Advanced font editor
for bin-mar and outline fonts.

Includes PC Paintbrush.

CIPCLE 434 ON PEADER SERVICE CAPE

SoftCraft Font Editor

SoftCraft Inc.

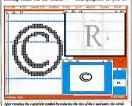
16 11. Curvell St., 75:80

Mudison, WI 53703

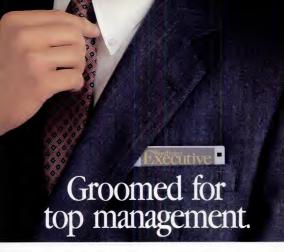
(608) 257-3300 List Price: \$290 (specify laser or dot matrix printer version). Requires: 459K RAM: Hercules, CGA, or EGA graphics (VGA uses EGA resolution). Microsoft-compatible mouse recommended.

In Short: Superbly capable bitmap font editor.

CHICLE 435 ON READER SERVICE CARE



tool. SoftCraft Font Editor is creating the registered symbol by the same method.



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NEW ON THE MARKET

Microsoft, Ashton-Tate, and Sybase Unite In an OS/2 LAN Database Server Package

SQL Server, a joint effort of MIcrosoft Corp., Ashton-Tate Corp., and Sybase, is a LAN base server engine that will work together with OS/2 and networks designed for it.

The software heavyweights expect SQL Server to spawn third-party database applications that will take advantage of this open-platform database manager. The SOL programmable core running on the server will let different workstation programs efficiently use the same data. The workstations can be running DOS, even though the server requires

Microsoft and Ashton-Tate say this will greatly reduce the network overhead needed to do a complete, intensive activity like a database search

SOL Server will manage 32,767 databases, the size of each being limited only by available disk space. One up-date can span 8 databases, and one query can open 16 data-bases, depending on available memory. It will accommodate

two billion tables, each with 250 columns and as many rows as storage capacity permits.

Microsoft plans to release the application in the second half of 1988. This announcement follows the lead of companies such as Novell and Univation that already implement database servers and other value-added processes in their net-

Microsoft will market the system to resellers, and Ashton-Tate will sell it directly to the

List Price: SQL Server, to be announced. Requires: 2MB RAM; IBM PS/2 Model 50, 60, or 80, IBM PC AT, or 100 percent 80286 or 80386 compatible; 10MB hard disk drive; LAN supporting IBM LAN Server or MS LAN Manager; OS/2 (for server), OS/2 or DOS 3.2 or later (for stations). Microsoft Corp., 16011 NE 36th Way, Box 97017, Redmond, WA 98073-9717; (206) 882-8080. Sybase Inc., 2910 Seventh St., Berkeley, CA 94710: (415) 548-4500.

CIRCLE 438 ON READER SERVICE CARD

List Price: CAD-Fax. \$1,995. Requires: 256K RAM, IBM PC AT or compatible, hard disk drive, DOS 2.0 or later. GammaLink. 2452 Embarcadero Way, Palo Alto, CA 94303; (415) 856-7421.

CIRCLE 441 ON READER SERVICE CARD

SnapShot from Aldus Freezes and Captures Video Images Directly No more will you have to scan

photos to get detailed video images into a printed document. SnapShot-from Aldus Corp., maker of Page-

Maker-takes images directly from RS-170 video sources such as video cameras. VCRs. and still video cameras and lets you edit and enhance them or put them into PageMaker, Version 3.0, or any other program that accepts TIFF or encapsulated PostScript files.

The \$495 package works with your AT, Matrox PIP or ITI PC Vision Plus image processing board, and RGB display. It performs darkroom editing techniques using a variablesize brush. You can create special effects such as mirror-

ing, painting with patterns, and sues on page 52)



Aldus's SnapShot, \$495, will convert RS-170 video output into image files that can be edited and enhanced in your page composition program

Add-in Card. Software Let You Transmit CAD Drawings Through Fax

GammaLink has introduced a hardware-and-software system that lets you transmit CAD drawings via fax machines.

Called CAD-Fax, the system also provides two other means of sending CAD files: through a built-in modem that can transmit at 9,600 bits per second or via a Haves-compatible 1,200-bps modem.

The \$1,995 system accepts either AutoCAD ADI files or Hewlett-Packard Graphics Language files. CAD-Fax uses Group III fax machines in the 200-dot-ner-inch mode

CAD-Fax divides CAD drawings into fax-sized (81/2inch) strips and inserts alignment markers so that you can join the pieces and reconstruct the original full-sized drawing.

Roca Research Add-in Board Boosts PS/2 Memory by 2 Meas on Models 25 and 30

30. It can yield a maximum of Boca Research is releasing the 2MB of LIM expanded memo-BocaRAM/30, an EMS board for use in PS/2 Models 25 and ry. It sells for \$175 with no



RAM in the IBM PS/2 Models 25 and 30 by 2MB.

memory if you want to populate it with your own choice of chips, or up to \$545 with 2MB of 150-nanosecond RAM on 256-kilobit chips.

Boca provides a RAMdisk utility, a printer spooler, plus 2 years of warranty protection and free technical support List Price: BocaRAM/30, \$175 (with no memory); \$225 (with 256K): \$345 (with 1MR): \$545 (with 2MB). Requires: IBM PS/2 Model 25 or 30. Boca Research

Inc., 6401 Congress Ave., Boca Raton, FL 33487: (305) 997-6227. CIRCLE AND ON READER SERVICE CARD

NEW ON THE MARKET

SnapShot

converting to line drawings. List Price: SnapShot, \$495. Requires: 512K RAM (640K recommended), IBM PC AT or compatible, Matrox PIP or ITI PC Vision Plus image processing board, analog RGB monitor and adapter, RS-170 video source, Microsoft Windows, hard disk drive. DOS 3.0 or later. Not copy protected. Aldus Corp., 411 First Ave. S., #200, Seattle, WA 98104; (206) 628-2375.

CIRCLE 443 ON READER SERVICE CARD

A Toner Cartridge for Laser Printers Halves Your Price Per Page

Repeat-O-Type Manufacturing Corp. is providing a system

List Price: Repeat-O-Type Super Laser Cartridge (for printers using Canon's SX engine) with four refill bottles, \$322.50; additional toner bottles, \$31,25, Requires: Laser printer based on Canon SX engine (for example, HP Laserlet II). Repeat-O-Type Manufacturing Corp., 665 State Hwy. 23, Wayne, NJ 07470; (201) 696-3330 or (800) \$26,5200

CIRCLE 442 ON READER SERVICE CARD

Context Searches Text In Your Editor on More Than 300 Billion Fields

LatiCorp has announced Context, a text-retrieval system for DOS or UNIX-based environments. It searches through your word processor or ASCII documents using logical operators, a thesaurus, and a stop list.



The Repear-O-Type Super Laser Cartridge, \$322.50, for Canon-SX-engine-based toser printers gives you 20,000 pages with four refills

for laser printer users that allows them to reuse ink cartridges. Its Repeat-O-Type Super Laser Cartridge includes a refillable cartridge, four bottles of toner, and accessories needed to recharge the cartridge.

The standard Hewlett-Packard laser toner cartridge costs \$125, yields about 4,000 pages, and is discarded after one use. Repeat-O-Type's system costs \$322.50 and yields 20,000 pages after four refills. This reduces the price per page from about 3 cents to 13/2 cents.

Repeat-O-Type fully warrantees only the cartridge and four refills, but you can buy extra toner at \$31.25 a bottle.

You can search documents, document profiles, results of previous searches, or combinations of these. Context provides

help screens and hint messages. The \$495 program displays a list of found documents, keeps a profile of the search, or displays the document for editing. List Price: Context, \$495; \$995 for Xenix version, Requires: 512K. RAM (640K RAM recommended). hard disk drive with 2MB free disk space, DOS 2.1 or later or Xenix (IMB RAM needed for Xenix), Not copy protected, LatiCorp. 185 Berry St., San Francisco, CA 94107; (415) 543-1199.

CIRCLE 444 ON READER SERVICE CARD

Ashton-Tate's Draw Applause **Dresses Up Graphics Presentations**

If you'd like to take information from dBASE, spreadsheets, and graphics software and then create charts, draw and edit images, and add display text to gussy up that information, Ash-

ton-Tate Corp. has a new solution: Draw Applause. This \$495 graphics presentation package is going head-tohead with Lotus's Freelance

Plus. The program uses pull-down menus, in which you can input commands with a mouse (the Microsoft, PS/2, or Summagraphics), graphics tablet, or keyhoard. There is also contextsensitive help, says Ashton-

Tate. You can import .DIF, .WKI, and .CGM-standard graphics files into Draw Applause. It will create a variety of graph types, including line, bar, pie, area, and mixed. You can change the colors, size, position, and layout of the graphs without losing the data. You can customize your is

ages with a slew of commands

that move, reshape, color, enlarge, align, fill, outline, and overlay your images. You can also select images from the software's library or add your own drawings to the library.

Word Charting lets you use templates to fill in text for titles and bullet charts in ten typefaces and 20 font sizes. You can customize this text with boxes. rules, color choices, shadow-

ing, and line spacing. Draw Applause supports the standard printers and plotters, and Ashton-Tate provides a modem service producing 35mm color slides, cibachrome prints. and black-and-white thermal

List Price: Draw Applause, \$495. Requires: 640K RAM; EGA. PGC, or VGA display adapter; DOS 2.0 or later for 51/4-inch-dish version, DOS 3.3 for 31/2-inch-disk version. Not copy protected. Ashton-Tate Corp., 20101 Hamilton Ave., Torrance, CA. 90502-1319-7213) 329-8000

CIRCLE 437 ON READER SERVICE CARD

∦APPLAUSE FOR BUSINESS GRAPHICS...



 Line charts Mixed cha

Table charts

A sample of output from Ashton-Tate's Draw Applicase, a \$495 presentation graph program that can import both worksheet and dBASE files.

CREATION





You've created a file or document on your PC. Now what?

Because most business information needs to be communicated, most people print the computer file and send the papers by mail, courier or fax. Or maybe send a floppy disk.

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EasuLink

Mastering Envelopes with an HP LaserJet: Solutions Ranging in Price from \$15 to Free



BY BARRY SIMON Not long ago I received a letter from a vice president of a major software firm. The letter was beautifully set, but the envelope was hand addressed! After all. what was the alternative: to print mailing labels from a database and risk having the letter discarded as junk mail?

Now that the HP LaserJet

Series II has an adjustable man-

easier chore than it was with dot matrix printers and the original LaserJets. Of course you'll need a software program, such as ENVLI or GRAR, to control the printer. ENVLJ. from JMB Realty

directly onto envelopes is a far

Corp., is a free program that works from the DOS command line. While you can type in individual addresses, its strength is batch mode. You prepare "data files" with a return address and

ual feed slot, printing addresses | additional addresses. You tell ENVLJ to print out one envelope per address, or get a listing of identifiers and pick only some to print out. Because of limited documentation on the structure of the data files, it took me a few tries to get everything right, but now I easily print out envelopes for a small monthly

> GRAB, from ZPAY Payroll Systems, is a resident shareware program (the registration fee is \$15) that uses about 25K RAM. It supports any printer with an envelope slot, but it has special support for Hewlett-Packard's LaserJet family. You can unload the program by running a batch file that loads it, runs your word processor, and then un-

> word processor. You install GRAB before you use it the first time to tell it a return address and to customize defaults, including a hotkey. This hotkey pops up a box that you place over the address on the letter you're typing. Hitting a key sends the printer a command to print an envelope with

> loads GRAB when you exit your

that address. GRAB worked well with many resident programs (although you can't unload it with SideKick in your system) and word processors, and in particular with XyWrite III Plus, which some HP envelope programs



ENVLI, Version 5.10 Steven Sterr JMB Realty Corp. 875 N. Michigan Ave. Chicago, tL 60611 List Prior: Free, but available only from a BBS or disk library. Requires: HP LaserJet, Laser-Jet Plus, or LaserJet Series II.

In Short: Simple program that prints out envelopes in batch mode Not copy protected. ORCUI 432 ON READER SERVICE CARD GRAB, Version 3.2 ZPAY Payroll Systems c/o Paul Mayer 3516 Ruby St Franklin Park, IL 60131 List Price: \$15 (shareware). Requires: 25K RAM, any primer that accepts envelopes.

In Short: Well-made, resident

program that allows you to highlight an address on screen and

print out an envelope with that address. Not copy protected. have problems with (see review of Addresselope, First Looks, page 46. PC Magazine, January 26, 1988). My advice is to grab

Doing It Yourself

If you have the time to send escape codes to your HP LaserJet Il printer, here are the sequences that you will need to print envelopes. For a quick way to send escape codes to the printer, see this issue's Utilities column. First, change to landscape orientation:

Esc&110

The Series II printer thinks that it's now ready to print on an 81/2by 11-inch piece of paper, and you have to work within that print range. For a number-10 envelope, try this sequence which uses a left margin of 18 and prints on row 12, column

Esc&a18118c12RJohn Doe 123 Main Street New York, NY 10011

The left margin needs to be changed again for the main address. Row 20 and column 50 is a good starting position.

Esc&a50t50c20RMary Doe 456 Main Street Boulder, CO 80322

Finally, restore the default margins, paper source, and orienta-

tion, using this sequence:

-Caroline Halliday and Gus Venditto

it Print! Clear! Extract Data Options info larry and Hertha Simon 112 M. Formona Ave. Les Asselma, CA 58826

ENVLJ works with either one address at a time or with a file full of them.

GRAB pops up over your document, letting you size a window around your address.

New! Introducing Turbo C 1.5 the best optimizing compiler gets even better!

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amount enclosed	\$	- Name	
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CIRCLE 137 ON READER SERVICE CARD

\$200 Guide: Hypertext for the PC



HANDS ON

BY EDWARD MENDELSON The biggest news across the border in Macintoshland is Apple's giveaway program called HyperCard, based on the razzle-dazzle concept of "hypertext." Some computer gurus claim that hypertext will transform our lives by giving us radically new ways to gain access to information. And now OWL International has swooped down over the PC Empire to bring us hypertext in the form of its

\$199.95 Guide. But don't get overexcited just yet. You use similar systems on your PC right now. Hypertext is essentially a database with no fixed structure. It links blocks of data so that you can jump directly from any block to any other block that's related to it. The context-sensitive help system in Lotus 1-2-3 is a simplc example. There's a fixed sequence, or hierarchy, of help



The box in the upper-right-hand corner is a Guide reference note. When Guide files contain links to other files, the screen can fill quickly with miscellaneous data

few keys

screens, but you don't have to follow it. You move the cursor to a topic, press Enter, and a new screen pops up with data about that topic. From here you can jump to other screens or back to the first in any sequence you like. A hypertext encyclopedia would let you jump instantly from a listing for Turbo

mensional medium," while a computer allows three-dimensional links among data. But the reality is exactly the opposite. The computer screen is a twodimensional medium with rigid limits on the amount of data it displays at one time. The real three-dimensional medium is the printed book. You can hold a book open at two or three places at once, flip quickly from one point to another, and keep a dozen other books open on the desk and on the floor. Hypertext, as Stephen Ma-

that "paper is a strictly two-di-

nes wrote in his column "Hypertext: A Breath of Air Freshener" (PC Magazine, June 9, 1987), constantly takes you down blind alleys. And John C. Dvorak added in a recent issue of MacUser that hypertext is profoundly antiuser, because you can never find out whether the essential fact you're looking for might be hidden down some alternate route or concealed under some text you didn't move the cursor over.

Guide will actually be most useful for highly structured data such as a repair manual. You could click on a parts diagram and find information on each component. But for most purposes, hypertext offers a lot more hype than text.

Microsoft: Widespread Acceptance Of OS/2 Is Still Many Years Away

HANDS ON

BY GUS VENDITTO

Microsoft has finally seen its vision of PC multitasking up and running, but in a recent policy statement, CEO Bill Gates said he's still not expecting to see DOS give way to OS/2 for many years more.

In a recent seminar, Gates indicated no major enhancements for DOS are in the works; he feels that the LIM EMS 4.0 standard will give that environment some more life, and said that Microsoft would build in support for larger disks and Algh-resolution display stars dards

Microsoft has often hinted that a future version of DOS would have a menu-driven mode. Zenith introduced such a system in its eaZy pc last year. And since IBM embraced SAA as an interface standard last year, there have been hints from IBM that pull-down menus would be added to PC-DOS Microsoft's plans are taking

into account a shift in PC sales away from the Intel 8086/8088 family and toward the 80286 and 80386 chips. In 1987, an estimated 42 percent of PCs sold ran the faster, multitasking chips, and in 1988, that share is projected at 55 percent.

Still, Gates believes those more-powerful machines won't be embracing OS/2 immediately. He outlines a timeline in which 15 percent of new PCs are running OS/2 in 1989. prowing to 50 years on by 1941. And that growth won't begin

until OS/2 1.1, with the Presentation Manager, is available sometime this fall. Microsoft expects to ship a preliminary version to software developers in March.

with a runtime version if you don't have Microsoft's package. It lets you consult and compose hypertext database files, or Guidelines, You scan a Guideline file by dragging the mouse through it. When the mouse cursor reaches a part of the file that's linked to a cross-reference or note, the cursor changes shape to tell you that hidden material is available. If you click the mouse, the material in the reference or note appears onscreen. This new material can be either text or graphics. Guide makes you use the mouse for everything. The cursor and PgDn

Pascal to turboiets or to Blaise

Pascal (1623-1662) by hitting a

Microsoft Windows and comes

OWL's Guide runs under

keys won't get you anywhere. Guide documents can have structures as complex as a miniature coral reef. Creating them is not difficult, but it is timeconsuming. You can prepare the text of your Guideline using Guide's rudimentary editor, but it's simpler to import the text from your own word processor. You can bring in graphics via the Windows clipboard. You then define sections of your file as replacements or cross-references and fold these under the main text. You can also link references to other Guideline files. Is it worth all the trouble to

put complex data into hypertext? Guide's manual claims



OWL International Inc. 14218 NE 21st St Bellevue, WA 98007 (206) 747-3203 List Price: \$199 95 Requires: 640K RAM; mouse: PC AT or compatible with EGA, or any PS/2; DOS 2.0 or later. Includes runtime version of Microsoft Windows; if run under the full version of Windows, also works with Hercules

In Short: Hypertext for the PC more interesting as a demonstra-Bench A constitution than the copy protected ORCLE 436 ON READER SERVICE CARD

Graphics Card.

Quattro lets 1-2-3 users do more without having to learn more

If you know how to use 1-2-3", switching to Quattro" is a snap. There's no back-to-school. It's not that 1-2-3 and Quattro are the same; they're not. But you can tell Quattro to behave in familiar ways, and the sense of familiarity you'll enjoy is more like the one you feel while driving home, but in a brand new sports car.



Quattro goes faster and does things better

1-2-3 moves along pretty well, but Quatro flies right by be-cause it does things differently and it does them sooner rather than later. Quatro's recales for example, are intelligent, which means it only recounts the numbers that count and doesn't slowly and unnecessarily recount the whole spreadsheet. And SQZI* Plus for Quatro automatically compacts and expands your spreadsheets by up to 95%.

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PC UPDATE

edited by Peggy Gavan

Galaxy Mercury Graphics Controller

GalaGraph has cut in half the price of its Galaxy Mercury PC graphics controller, to 5995. The controller, which is compatible with Auto-CAD, Release 9, displays up to 16 simultaneous colors from a palette of 4,096 and offers resolutions of 1,024 by 768 or 800 by 600. The Galaxy Mercury is available from Electrograph Sales, Bohemia, N.Y.; (516) 563-1320.

PageMaker/ Windows Fix

With Aldus's PogeMoker, Versions 1.0 and 1.0a, users must convert PogeMoker's font files before running the program under Microsoft Windows, Version 2.0, or Windows/386 by using NEWFON.EXE, a conversion utility included with Windows that allows Poge-Moker's toolbox, ruler guides, and page icons to display correctly. Although this utility is not covered in the Windows documentation, users can get information on the conversion procedure by reading the Windows README.EXE file when running the Windows setup program. In addition, files created with Windows Paint, Version 2.0, cannot be placed in PogeMaker 1.0. Aldus Corp., Seattle, Wash.; (206) 622-5500.

PC-File Plus, Version 2.0

PC-File Plus. Version 2.0, supports summary graphics for creating horizontal and vertical bar charts and line, scatter, and pie graphs. The new version also adds a calculator hottey and detects and uses an 8087 or 80287 floating-point processor. Other enhancements include



PC-File Plus. Version 2.0. adds the ability to create bar charts and line, pie, and scatter graphs.

an increased maximum file size of 200 characters and a maximum record size of 3,000 charcaters, pile an upgraded report writer. FC File Plus retails for \$69.95; upgrades are \$30 for registered users of earlier versions. Button-Ware Inc., Belleyue, Wash; (200) 454-0479.

Ricoh PC Laser 6000

Due to the fluctuation in the value of the Japanese yen against the dollar, Ricoh has increased the price of its PC Laser 6000 by \$100. The



The Ricoh PC Laser 2000 printer now has a price tog of \$2,495, an increase of \$100.

new suggested retail price of the printer is \$2,495. Ricoh Corp., San Jose, Calif.; (408) 432-8800

R:Bridge, Version 3.0

R-Bridge, Version 3.0, supports Microrim's concost-to-be-released R-base for DOS and R-base for DOS and R-base for DOS and Interpreted 1.5, and fution to Bortland's Turber Dose 1.5, and Turber Dose

D.A.V.E., Business Templates

Goldan Computer Services has released Business Templates for its D.A.V. E. 1-23 productivity tool. The ten new templates—predefined sets of worksheets, macros, and D.A.V. E. Gornelle Controlled Cont

IN BRIEF

COS-states Venino 2.4, supports say commiscation port and has a maximum based met expector 9.8, 400 bits per second. In addition, version 2.4 dask billing log, session second-ing, and color and grassless support. Upgrades color and grassless support. Upgrades second control of the color and grassless support. Upgrades support and color and grassless support. Upgrades and color and color and grassless support. Upgrades and additional form 2 technologies, Red Bank, N.J.; (201) 741-2322. Price Waterhouse to added the Mater Tax Monagement System and Companies of the Color and Companies and planning capabilities for all succompliance and planning capabilities for all successives. Price Waterhouse Maximum States and Color and Color

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Western Nortal	BC-1005-102	2.7 RLL ancoded his/1d for AT g q ga
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Failtsa	FO-FUJ-25551005	1.2M, 16 ht, 5.25", grey for AT
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Peace Games

An expert system developed by Rand Corp. to help military leaders use computers to simulate international conflicts generally kept concluding that escalation into war was irrational. So the Pentagon ordered Rand Corp. to reprogram the system to declare war more often.

—Federal Computer Week.
November 2, 1987

What's the Policy On Shooting PCs?

"Community Service Officer Mark Wollmershauser was given a 20-day suspension without pay beginning Jan. 21 after the review board ruled be violated policy for accidentally shooting a typewriter at the Tulsa International Airport."

—Tulsa (Okla.) World, Jan. 31, 1987

Amazing Facts I

Options Page Type Lines Shades

"ROM means "Reader Only Memory," a reference to the fact that ROM chips are permanently recorded and cannot be altered, unlike RAM (Reader Access Memory) chips more familiar to computer users." —The New York Times, October 17, 1987

Amazing Facts II

"Total Word runs on an IBM PC, XT, AT or compatible with one floppy-disk drive and one herd disk, at least 480 Kbytes of available RAM In 3.5inch format it requires 720 Kbytes of available RAM." —MIS Week, November

-MI 16, 1987



An illustration from 50 Things to Do With a Used Mouse, published by Macrospeed, of Fremont, Colif. Macrospeed makes FastTrap, a \$149 three-sxis pointing device that serves as a mouse alternative.



It certainly is easier to watch over them these days."

Heard or seen asyming affirers, musuod, or just pinic dumb about the computer industry. The "Stand your differing to Communiques, FC Magazine, On Park Arones, New York NY 10006, or MCI Moil 157-9801. Please print your more legibly, include the name, city, and publication that of agon we resuper citypine, can disculse your "Ashir a low. Commissions receive \$50 and a PC Magazine" Ishin. In cose of displaces enrice, the enrichts passoned Provisil. Sure, but centers can't be a described aged.

Winners this issue: Howard Smallowitt (PogeMaker trash), Robert Bennett (typographts), Robert Barnett (Reader Access Memary), Dave Ramsey (Total Ward), Ron Bushop (war games), Stan Dupree (typowriter shooting).



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STEALING A MARCH



American computer manufacturers can compete—and excel—in global competition using the quality techniques invented here and perfected by the Japanese.

Tike to visit companies almost as much as I like visiting user groups. I learn a lot about the products, their manufactures. Often, I also get a peck at products that are still in the design phase. That is a tremendous help in tunning the future focus of the magazine, making sure that it's what you want und need.

One of my most heartening visits lately was to Moniterm Corp., the Minnesxta firm that produces those marvelous highresolution, large-screen monitors. Moniterm started out as most firms do, with a single product and a dream.

Desktop publishing, computer-aided design, and windowed operating environments were on a convergent course with Moniterm's monitor. The company broadened its product line and began building a variety of monitors on a traditional assembly line. They ran into the traditional problems. A new product with teething pains could hold up older, easy-to-build products on the line. Quality was low. Rework was high. Morale was nothing to write home about. Work-in-progress inventory was astronomical, a crippling burden for a company trying to grow on its receivables. The assemblers and technicians were at the receiving end of decisions made by designers, manufacturing engineers, and purchasing agents. Manufacturing filled a 65,000-square-foot area, with little to show for it.

JUMP IN Despite these obstacles, Moniterm progressed, introducing new products for both the PC and Macintosh marlets. But it knew something had to be done, Dave Brayd—vice president of manufacturing—and others from Monitern attends senimans and read up on just-in-time manufacturing and qualitycists. They discussed these these interesttions of the properties of the properties of the properties of the properties of the proteed of the properties of the properties of the properties of the properties of the proteed of the properties of the properties of the second such properties of the properties of the second such properties of the second such properties of the properties of the properties of the second such properties of the properties

Moniterm created a six-person 'etgl', with full mandicaturing responsibility, from perping of subassemblies to power on and alignment of the finished unit. Cell members could flip on a flashing red trouble beacon over the cell's work area if they encountered a problem that either prevented them from building units, impedeb their progress, or lowered the quality of their work. Manufacturing engineers were the success of the problem of the properties of the problem of



and resolve each problem. Cell members could call a meeting at any point—with anyone, up to the vice president of manufacturing—to resolve issues or air new ideas. A big flip chart chronicled recurring problems so that they could be identified and eliminated.

The quality and productivity of that first cell were noticeably higher than those of the traditional production line. So Moniterm set about dismantling the assembly line and converting over to JiT cells. When the remodeling was done, there was room left over or the shorp floor.

Now cell members design their own work areas. The layout and selection of hard tools is up to the individuals. They also do their own quality checks on incoming parts and components. Vendors used to meet with Moniterm's purchasing agents to resolve quality issues; now here in the contract of the contract with cell they in the with cell they be most with cell a handson demonstration of how their products are used and when problems can occur, along with suggestions for improvement.

STAMP OF APPROVAL One of the most coveted possessions a Moniterm worker can have is the inspector's stamp. It signifies that the bearer is qualified to pass judgment on the finished product's acceptability to the end user. It takes months to get this stamp. It takes diligence to keep it. Inspection teams audit each cell's work. If the output doesn't measure up to the company's standards, those teams have the right to withdraw the





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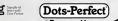


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stamping privilege until quality and inspection standards return to the norm.

The result of all this? Almost too good to be true. Work-in-process inventory is just a fraction of what it used to be. Reworks are practically nonexistent. Production per person is way up. Overall quality is up, too. And the quality of life for the production worker is far higher. Moniterm recently closed its Taiwanese assembly operation, finding that it could build the units cheaper and better here in the United States. In fact, Moniterm is doing its share for the balance of payments-it's a net exporter.

TO BE CONTINUED That's a pretty little success story, but is it finished? No. not yet. Moniterm is just now beginning to get its suppliers to ship smaller quantities, more frequently, in order to cut inventory costs and space. That's what most people think of when they hear about JIT manufacturing, but it's only the tip of the iceberg. The entire process must be geared to it or you wind up with shortages, schedul-

ing nightmares, and chaos.

Moniterm, though only a microcosm of our industry, makes a compelling argument that foreign suppliers and foreign labor are not prerequisites for success in this business. In fact, we may see quite the opposite effect. The recent devaluation of the dollar has created a de facto protectionism. or at least raised the hurdles a bit. That will tend to shift the nature of the competitive process from cutting sharp import deals to producing domestically. And the victory will go to the company that can produce the most efficiently.

GLOBAL MARKET, LOCAL SUCCESS

I'm not espousing protectionism. This is no latter-day Monroe Doctrine. The economic realities are clear. A devalued dollar and a strong domestic economy, complete with low unemployment and cautious optimism, mean that the market is here and the work is, too. Manufacturers who are currently importing need to take a careful, courageous look at their costs. The courage part comes in when you give serious consideration to selling to the very channels you're buying from today.

This is the time to sell to-not sell out to-foreign interests.

Roger Staubach and Terry Bradshaw on Dac-Easy Light.



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Roger: Of course I'd never argue with you, Terry, about Dac-Easy Light because I know it's perfect for office accounting. Dac-Easy Light let's me concentrate on doing business, not accounting. Using the predefined chart of accounts,

ideal for small business. I can enter customers and vendors - and start processing invoices and checks in just minutes!

Terry: Roget, when did we ever disagree about anything? You know Dac-Easy Light is perfect for home accounting. Light makes home finances fast, fun and easy. The preset home chart of accounts has everything I need. I can write checks and do bank reconciliations by computer without knowing the first thing about accounting.

Roger: Light makes it a snap to track sales and budget expenses for up to 12 months on-line. With Light, I know my business' current financial status in minutes.

Terry: It's the same with home accounting finances, Roger. I can get my personal net worth in seconds since Light instantly reflects the effect of changes, payments, withdrawals and deposits.

Roger: Light gives me the option of handling accounting on a cash or accrual basis. Plus, if I forget any account or customer. I can quickly call it up in

Terry: Well don't forget this, Roger, With Dac-Easy Light I can quickly set up new credit card accounts, post receipts, and keep tabs on current card balances. Plus, I don't have to know debits or credits because the system knows and automatically does them for me.

Roger: Terry, for once I think you're tight. Light's so smooth and easy to handle, even you can use it.

Terry: And you're right, too, Rog. Using Light, you'll have more time to spend on the golf course. I just hope you're not trying to compete with my hall of fame game!



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LIKE A SHARK: MOVE FORWARD OR DIE!



Trying to stay current with the latest advances in technology can be a dangerous proposition. But not nearly as dangerous as standing still.

As we move into the next generation of personal computing, we look back at over a decade of change. It's a decade highlighted by false starts, road blocks, and dead ends. This dubious track record makes it difficult to predict the future direction of the business. But one thing we know for sure: things keep changing, and keeping up with change means a commitment to chanse.

Some trends are apparent. These are the trends that will always be with us. They are: (1) the trend toward greater processor speed; (2) the trend toward griping about speed; (2) the trend toward griping about you do or root; (3) the trend toward trailbry you do or root; (3) the trend toward trailbr and disks with begger capacities; (4) the trend toward higher and higher screen residence; (3) the rend toward higher and reaster and faster moderns. If I go on, we quickly see the trend toward faster and faster moderns. If I go on, we quickly see them. The floopy disks are getting smaller—from 8-inch to 5½-inch to 3½-inch and probably down to 1½-inch. The dos on the screen are getting smaller—from 6-inch to 3½-inch smaller and floopy and faster to accommodate the displays cards faster to accommodate the

Unfortunately, it's the trends themselves that lead us into false alleys us into false alleys selves that lead us into false alleys product fitting used dead ends when an obvious product fitting used. In the formula comes into play. For examine play, a few years back, a lot of vendors were suschered into believing the Tabor-believing the Tabo

nately, nobody told the hardware vendors, and the drive was never put into a machine. Others such as Amdek, looking to make a killing, were in production of a 3inch drive. It flooped too.

indictative. It reppeats to the corner from the 8-bit world into the 16-bit world in the technis wered it cowinced that the 2-8500 would be the dominant chip on the 16-bit world. When the 18-bit world in the 18-bit world in 18-bit world i

ONE BACK, TWO FORWARD Which brings us to another observation. The industry moves forward in a herky-jerky manner. To move from a red-hot CP/M Z-80 machine to an early IBM PC with its



cassette drive or 160K flogyp disk drive was a step backward. The 2-80h shed disks, megabyte-capacity 8-inch flogpies, and all sorts of hardware. And they were fast. The IBM, though, had more postern tal. None of the potential was apparent to the CPPM-bers, many of whom still comtact CPPM mechine with its large 5-100 bus cage and nonswitching uninterruptible power supply. Maybe it did—for them. All I know is that the scrap metal business is enger to get it hands on these beavy old

So, we can say that the industry is kind of like an amusement park. You can stay on one roller coaster forever, or you can get off and try something new. It's an expensive proposition, but necessary if you want to reach the next height. We are still getting to our peak with the IBM PC as we upgrade to the 386 speed burners. Not much has changed with our software from a couple of years ago (if you haven't noticed) but, my, how it screams. We may well peak with the 386 screamer and its superfast hard disk and its megabytes of RAM, all pushing a 640 by 480 Enhanced VGA display and a hi-res monitor. Compare this baby with that old CP/M Z-80 clunker!

Problem is, we're back on the treadmill. We have to expect to give up this system for the next ride in the carnival. Initially it will be a step backward—like before. But we must either move forward or be doomed to the Flying Dutchman fate of those pathetic CP/M adherents. Nobody wants that destiny.

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INSIDE TRACK

IBM is getting ready to flex its muscles. No one-not even Microsoft—will be safe when it happens.

The hottest gossip over the past few months is about a secret IBM executive-level memo outlining a ten-point plan to improve IBM's profitability in the PC business. I don't know anyone who has actually seen this mysterious memorandum, but plenty of people say they "know a guy who . .

While I have been unable to ascertain all the specific weak spots that IBM has targeted. I was told a few things of interest. First, IBM supposedly wants to rid itself of all royalty arrangements by the end of 1988. This means Microsoft and MS-DOS. When I mentioned this possibility to a friend, he said. "Why would IBM want to do that? Microsoft is largely responsible for IBM's success in the low end."

It's kind of like those old Western movies where the tough sheriff runs the bad guys out of town and civilizes the place. Pretty soon, the grisly sheriff doesn't fit in anymore, as the townsfolk want to go upscale and "elect" a popular sheriff who isn't known as a gunslinger. They run the old sheriff off. A few days later, a horde of drooling desperadoes find their way to the town. You know what happens then.

I can imagine the meetings at IBM. "We have 400,000 employees. Why are we spending hundreds of millions of dollars on Microsoft when they aren't doing anything we can't do!" This rift is inevitable and everyone knows it. The smart money predicts that Microsoft, a company known to dabble in hardware, already has a PC designed and ready to roll.

Another issue outlined in the memo and high on the IBM agenda is legal action against anyone who tries to clone the Micro Channel. The company has made it pretty clear that it isn't going to be cloned to death "like the last time!"

This brings mc to an interesting research report sent me by Brian Swift, director of Henry F. Swift & Co. It's about Computer Automation, the company that invented many of the Micro Channel patents. This is the same company that, years ago, marketed a product called the Naked Mini, which was a lowball computer designed in hopes of selling expensive add-in cards. They figured the profits were in add-in cards. Unfortunately, some other guys saw an opportunity to sell cheap add-in cards, thus steal-

ing sales. Sound familiar? So, to combat this affront, Computer Automation invented the Automatic Modular Memory Address Allocation System, which, it turns out, is the key to the Micro Channel. This system was designed by Computer Automation to create a handshake system between the system software and the memory. If the memory didn't come from Computer Automation, it didn't work. Is the rancid-

ity level rising enough for you? Now when you hear about troublesome PS/2 add-in cards from third-party

vendors, this may be a clue. According to the Swift report, card makers such as AST and others are at the Computer Automation door vying for a license. What's IBM to do? Well, since IBM doesn't want to pay royalties anymore, it could just buy Computer Automation and cut everyone out. It could buy the patents too. Besides that, it's obvious that IBM has a proprietary spin on the pitch not covered by the Computer Automation patent; otherwise, legal action would have to stem from Computer Automation. I assume that IBM will give them a hand, though. It's all too much.

The irony of all this is that it may for-

ever spell doom to the American microcomputer industry. Why? Well, who in his right mind is going to say nuts to IBM and storm ahead with a Micro Channel clone? Who has the nerve for this kind of power play? Try Mitsubishi. Fuiitsu. NEC. Try the Taiwanese or the Koreans. These boys, en masse or one at a time, will take on IBM. They hate IBM. It's an international issue. The big American companies are too chicken to risk it all in such a gamble and the small guys can't afford to be bled to death by IBM in the

Welcome to the final frame. The Asians will produce the Micro Channel clones. They will be Asian brands without an American firm even putting its name on such a machine for fear that IBM will lower the boom. It will be a pathetic ending if it plays out this way. The innovators will look elsewhere to inno-

I wonder what a condo costs in Tai-

wan, anyway? Genuincly Interesting Software Dept.: Since we're talking so much about lawsuits, let's discuss some software that my attorney, Peter Franck, told me was the greatest thing since sliced bread. CompareRite from JURIsoft (763 Massachusetts Ave., Cambridge, MA 02139; (617) 864-6151) compares documents in ways that I didn't think were possible. It's utterly amazing. It's \$129.95. Perfect for attorneys, editors, or anyone who has to make or compare different drafts of the same document. Outstanding software-the best of its

My Current Computer Dept.: If you want incredible 386 speed, check out System Integration Associates' machines (222 E. Pearson Ave., #502, Chicago, IL 60611; (312) 440-1275). I'm getting benchmarks I can't believe-check it out. They claim to be the fastest 386 screamers, and I have yet to see anything faster. Not expensive, either.



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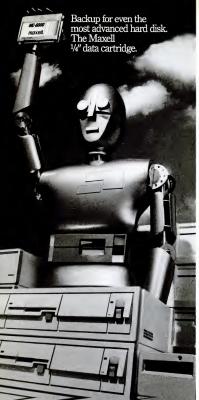
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ON BIGOTRY: THEIRS AND OURS



PC bigots look at mainframes as peripherals, while mainframe bigots see PCs as smart terminals. Corporate America's future information needs demand both groups' tolerance.

6 6 T ut that's just because you're such a mainframe bigot." A good friend tossed that line at me the other night, as we were debating PC-related issues before an audience of corporate micro managers. He knew he could get away with it, because he and the audience also knew it wasn't true. In fact, of course, that's exactly backward: I've become a flaming PC bigot.

And, worse, an unrepentant one. A lot of us who rely on PCs have succumbed to that kind of bigotry, of course. And like all good bigots, we feel warm, smug, self-satisfied, and entirely correct in

our bigotry.

The mainframers see our little machines as smart terminals: we see their big-iron stuff as expensive nonlocal peripherals. They love batch and we love interactive. They worry about security and access and data integrity, and we worry about . . .

hey, wait a minute! I worry about security and access and data integrity, too. Oh, ieez. You don't think I'm becoming . . . one of them?

LIVING IN THE PAST There are lots of good reasons to love PCs and to regard less fondly the stuff downstairs in the Glass House. Those middle-aged guys with the graving crewcuts who tend the 370 actually think people ought to build graphics screens by entering command files, rather than working interactively with Harvard Graphics of Graphwriter II.

They think "flow control" are words to live by. They regard backers as a vile and dangerous lot, not as people who've

pushed the PC envelope hard and fast, to our collective benefit.

And it just doesn't bother them, damn it, that it takes a year or two to get to users' requests for new kinds of reports from all that data lurking in their magnetic archives, while you and I write report specs for dBASE and Paradox on the fly and cross-tab our way through Reflex files while talking on the phone. They do seem of another era.

But be wary, if you're a PC user in a company that has seen explosive growth in personal computers over the past 4 years or so, about sneering at those people. Times, they are a-changin', and you may be relying a lot more on those grunts who live in a COBOL world than you expect.

In corporations throughout the country. infocenters (by which I mean end-user computing centers in general, by whatever other name) have seen sharply increased cuts in staff, budgets, and authority over



the past year and a half.

Corporate micro managers, whether working within infocenters or heading up their own little shops inside or outside the MIS department, are finding they have fewer resources and fewer responsibilities these days. Many believe their staffers are being dispersed throughout the company as a prelude to eliminating the micro-management function.

The problem, many hear, is that they've done their jobs all too well. PCs are onboard and working. Employees accept them, like them, and use them routinely. Further development can be handled just fine by the in-house development people already on-board in the . . . you guessed it, MIS department.

Which, if you've taken a look around lately, isn't necessarily all bad.

SEEING THE LIGHT Ouick test: Where is the most interesting Microsoft Windows-applications development going on these days? I asked that of a couple of managers at Microsoft recently. I wasn't surprised when both got the answer right: in Corporate America. Not among software publishers

Ever since Microsoft rolled out its second-round Windows vision a year and a half ago and showed, at a Windows on the World party, Reuters's slick applicationin-development using Windows' Dynamic Data Exchange to gather and track market prices, a large and committed bunch of corporate MIS people have been working quietly on sophisticated, proprietary Windows-based applications.

JIM SEYMOUR

Even if you and I don't believe, they're saying they've got the faith: Windows works. These are mainframe bigots? Since last summer many of those same

people have been retooling themselves

into OS/2 experts. When OS/2, Version 1.1, hits later this year, they expect to move big, complex applications onto it in short order, while we PC bigots continue to stand around arguing about OS/2, DOS, and how many megabytes of memory we

need. These PC-savvy in-house systems developers have emerged-or rather, are just about to emerge-as new and potent strategic power points in shaping the directions of the PC market in the 1990s. Where once the micro manager was the single. visible focal point of corporate PC planning, adoption, and implementation, these in-house systems people are now grabbing those reins

As one sun sets, another rises,

That's not to say all these in-house people are particularly PC-wise, of course. Buying a copy of RM COBOL doesn't make you a PC systems expert-though

 Where once the micro manager was the single focal point of corporate PC planning, adoption, and implementation, inhouse systems people are now grabbing those reins.

the nineties

some of them seem to think that's all it

But a fair number of the younger MIS people I've run into over the last year or so have gotten religion. Our religion. They understand why we like PCs and hate mainframes, and now they're building PCs into their plans, as integral parts of their companies' information strategies for

So listen up, buddy. And see if some of those people you gave up on a couple of years ago don't suddenly seem a little smarter now. And a lot more aware of the

PC's strengths than they once were. And watch that PC bigotry. Because you may find yourself working side by side with one of those reformed mainframe bigots sometime soon, on a PC project close to your heart and to the company's wallet.

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DADDY'S HANDS HURT LIKE THE DICKENS



Poorly designed keyboards cause frustration and irritation. And in the wrong hands, even good ones lead to painful and disabling injuries.

here was always love in Daddy's hands," claims a recent country charbuster. But that was before Pop got his hands on a keyboard. Now what's in Daddy's fingers as he tickles the plastics is frustration and

Fustration? IBM's Enchanted Keyboard, the one that arrived as a miproveners," with late-model ATs and the endy one you can get with the PSA of the endy one you can get with the PSA of the end to counting the sawed-off job that comes with the Model 250, manages to cause even more annoyance than the original. That one provoked howls because it didn't quite follow the IBM Selectric standard, probably because back then IBM didn't want its PCS to compete with its prices Displaywrier word processing systems.

Except for the placement of its Esc key the original AT Exploand seemed a sep forward. The new one steps the other way. For openers, the wacked-out placement of the Crit and Alt keys allows down any software that uses them. The function keys across the top row play havce with programs that rely on the formerly easy-torach shifts thereof. About the only interpretable the control of the control

TRIAL AND ARROWS Other vendors have their own cute tricks. Enough already! Did IBM change the Selectric typewriter keyboard again and again? Not hardly. Later models had slightly wider keys with a slightly different feel, but they

were in the same relative positions.

They were also differentiated. The Sective deletion key, the typist's boom that backspaced and physically synthed ink. from page, was denoted by a hollow arrow with an X in the middle. You can't easily display that on our screens, but Illaw Bid keyboards could certainly use something like ill—an arrow with an X on the tail would do—to distinguish the Backspace for a works with an X on the tail would do—to distinguish the Backspace for a works with one of the back page for a works with one of the distinguish of the foreign and the difference. At the very least, it would make manuals a lot less confusions.

But here we're addressing mere frustration. Pain is more serious, and there seems to be a lot of it going around. People are beginning to wonder why their hands hurt during long days in front of keybeards—and afterward. The problem appears to be growing and has disabled at least one person 1 ktnow. I have havinges of it myself. Officially known as



repetitive strain injury (RSI), it's found among workers whose hands move in repetitive patterns on the job—such as meat cutters and, alas, keyboard users.

The scope of the problem is still poorly documented, SE, which encompasses everything from tendonitis and encosprovaits to carpat tunnel syndrome, is difficult to diagnose and treat, so research differs as to diagnose and treat, so research differs at not everybody who types for a living ends up with aching hands, but encuph disable, but encuph disable, but encuph disable there are also be the significant costs of workers' compensation, disability payments, and retaining.

ACHES AND PAINS The tendons in the hand seem to be the primary culprits, becoming irritated from constant motion against bones. Deviation from a straightwristed typing position—it happens every time most users reach for function or arrow keys—can exacerbate the problem and involve the nerves of the hand.

Prevention techniques include keeping the wrists straight, taking frequent breaks, and stopping before pain sets in. Worthwhile suggestions: treatments range from keyboard abstinence to surgery, and some victims with advanced cases can never troe without severe pain.

There are many unanswered questions about RSI—especially why cases seem to be commoner and more severe than in the days of the good old typewriter. One answer may be that the typewriter at least forced a rest and change in hand position at

■ STEPHEN MANES

the end of each page. And people tend to use computer keyboards longer without breaks; the incessant clatter of type against platen tended to limit the time one spent with the typing machine at a single go. Key position may have something to do with it, too. After investigating the subject, Stuart and Barbara Herzog, principals of Tucson's Herzog Research, patented a new keyboard design that realigns the left-

hand layout. Not radically, just enough to make the felt-hand keys line up in neat diagonal columns the way the right-hand keys hos up the keys do, so that the fingers of the felt hand don't have to reach backward and force the wrist out of line. Although it does change key positions, this keyboard doesn't change the key order in any way, which should make it easier to learn than more-extreme proposed reworkines.

Granted, this is at best a partial solution. People get RSI symptoms in their right hands, too, for which this new keyboard layout does nothing at all. The one RSI victim I know had vorze pains in his right hand—from the extra motion in reaching over to the currox keys, he believes. Still, it's gratifying to know that somebody is at least looking into the problem.

TECHNOLOGICAL FIX More people probably should be. Technology might somehow come to the rescue if anybody took the problems seriously enough to mount a concerted effort to quantify and solve it. Certain current keyboards are thought to be better at preventing the probable. The probable is the probable of the probable is the probable of the probable is the probable of the probable in the probable is the probable of the probable is the probable in the probable in the probable is the probable in the probable in the probable is the probable in the probable

tion that won't be adopted soon.

I wouldn't be to notice recognition to be a timely answer either. Although gurus assured me a couple of years ago that the advent of 386 machines would supply enough raw processing power to make voice-recognition sing, what I've seen so far has been pretty off-key as soon as you get beyond a very limited vocabulary—say, the words commonly used in a specialized medical database.

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Graphics

Software:

At the Top of the Courts

presents the top ten graphics packages from Ashton-Tate, Lotus, Digital Research, Hewlett-Packard, Microsoft, Garrison Software, Enertronics Research, and Software

Publishing.

PC spreadsheet programs have gotten somewhat better recently and, with new players in the market, are also getting a little cheaper. Word processors have gotten a little faster and somewhat smarter, and coat a little less than they used to. Database managers are a little easier to to. a little less than the succession of the use and, if not yet less expensive, at least don't cost any more than they did a year or two ago.

two ago.

But look what's happened to graphics
programs over the last year: the quality of
both the programs themselves and their
output has improved dramatically; the
unumber of major players in the market has
increased; and the prices of the major
packages, while not exactly cheap, are
generally lower than they've been for
years.

Software Publishing's Harvard Graphics, Microsoft Chart, Hewlett-Packard's g

Graphics Gallery, and Enertronics's Energraphics are still searmbling for the top of the heap. New to the fray is Windows Graph, from Micrografx—along with Microsoft Excel and PageMaker, it's one of the three most exciting and useful programs for the Microsoft Windows operating environment.

WHY NOT 1-2-3? In some ways, presentation graphics programs have been the old peckages out in the PC software basiness. Not nearly so while, used as the other members of the Big Five of personal comparison of the area of the personal comparison of the area of the personal percentage of the personal personal personal percentage of the personal personal personal personal perpendicular personal p

The built-in, if feeble, graphics features of Lotus 1-2-3 have contributed to that perception. Since what we're graphing with these packages are numbers, and since most PC numbers come to life in and are stored in 1-2-3 spreadsheets, it seems so much more logical to take them to graphical form within 1-2-3 itself. Why buy, install, learn, and grapple with a second package that duplicates what 1-2-3 already dross?

Because it's painful to look at 1-2-3 graphs.

With their ugly hairline fonts, scratchy fill patterns, and severely limited options, 12-3 graphs belong on computer screens as quick-and-ditry one-touch analytical graphics—not as presentation graphics to be shown to others. Difficult to rive and sometimes to understand, out of sync with the quality of the other visual materials that surround us in bosiness, 12-3 business graphics fall at the two most basic materials. We've become accusationed to better work, we wory about the business, judgment of those who bring us these colored chicken scratchings.

GRAPHMANSHIP, CIRCA 1988 You can see that phenomenon at work in the conference rooms of corporate America. Three years ago, the corporate swordsman who appeared for a meeting with a few 1-2-3-produced overhead transparencies. slapped them on the projector as he made his points, then sat down with a smirk, was seen as a comer. It didn't much matter that some people couldn't read the numbers on the screen-nor, perhaps, even the headings and the category and value labels-and that many found the graphs added little to the impact of his presentation. He had a bullet in his belt no one else had, and that was enough.

This guy used his own graphics! From 1-2-3! Made 'em himself. He really knew what he was doing. He was on top of his job and on top of all this computer stuff, too. Boy, was he on the fast track.

Today, at many companies, 1-2-3 overheads on the screen clicit responses ranging from sardonic chuckles to snores. No one is much impressed, and no one thinks the presenter is on top of much of anything. It's a good time to get another cup of coffee.

Why? Because we've been conditioned by the dramatically better graphics we see all around us, from magazine pages to television screens to, yes, our own PC screens. We expect more. We know there's something a lot better than 1-2-3 graphics for presentations, and we want that better stuff.

And that's what today's packages deliver. Almost as easy to use, an sonar cases as 1-2-3 itself, they produce results that are more easily read and understood. They're

more professional. They're more persuasive. They work.

AUTOMATED GRAPHICS We're also seeing new ideas introduced with these new high-end programs.

The best of these new ideas may be the automated spreadsheet and database links found in Lotus Development Corp.'s new Graphwriter II. The old Graphwriter, which came out of the long-gone (and hap-

The new Graphwriter adds to a logical new interface the ability to create permanent links between defined graphs and certain spreadsheets.



pily forgotten) era of UCSD p-system software from the early days of the IBM PC, was a long-running corporate hit.

In part that was because its chartbook approach mimicked that of popular mainframe graphics programs. In part it was because, almost alone among all the major graphics packages, Graphwriter supported such obscure chart types as the magnificently useful bubble chart.

The new version of Graphwriter gives up nothing in the versatility department but adds to an intelligent and logical new interface the ability to create permanent links between defined graphs and certain spreadsheets.

If your company routinely maintains and graphs a series of 1-2-3 spreadsheets that track corporate progress in the usual areas—gross sales, net revenues, inventory turns, sales per employee, and so on—with Graphwriter If you can now create a series of de facto charting templates that will a your command, automatically gather the updated data from those spreadsheets and produce sets of graphs in a con-

stant, month-to-month format.

You can even use data from those spreadsheets to change chart design items, such as colors or fill patterns. And you can produce sets of up to 100 of these graphs with a single command while (if you have the right kind of automatie-feed output device) you go out for lunch.

MAINFRAME POWER That kind of automated data-retrieval power has previously been reserved for expensive mainframe graphics programs, such as ISS-CO's Tell-A-Graf and other packages, for which the cost of 1 year's leasing will buy a lot of PCs and PC software.

Indeed, that disparity between the costs of mainframe graphics packages and those of setting up PC graphics workstations has been a primary force driving the PC graphics software market. As micro managers and information center staffers realized bow close they were to matching main-frame graphics packages' sophistication and output quality, they pushed PC soft-ware vendors to go that last mile.

Only the publishers of mainframe graphics software come up losers in the transaction; the winners include anyone who wants to produce good-looking graphics on a PC with a minimum of fuss.

WINDOWS ON THE FUTURE We're also seeing new ideas of another kind, exemplified by Micrografx's Windows carphilified by Micrografx's Windows Graph. With Microsof Exzel for a spenad-sheet, Blyth's Omnis Quarte for a database manager, and Windows Graph, the Windows Graph, the Windows to Graph, the Windows Graph, the Windows to Compare to the Compared to the Compared

If you're into desktop publishing using Adule's Pagedwater, Windows Greph will be all the graphing power you'll need. The ease of exchanging data and files among native Windows applications, such as PageMaker and Windows Graph, make the two a natural for proposals, newsletters, and other common grist for the desktop publishing mill.

But there are good reasons to consider. Windows Graph even if you aren't a budding Gutenberg. One is Windows's Dynamic Data Exchange (DDE), a littleknown means of passing information from one program to another in real time.

While your Windows-equipped PC is logged on to Dow Jones News/Retrieval, for example, receiving London spot precious-metals prices, that data could also be written through the DDE facility into a spreadsheet log and passed into a Windows Graph vertical-bar chart, plotting the market fluctuations for your instant inspection and action.

That bar chart could be set up so that your target buy and sell prices were represented by bold red and green lines across the chart. When a bar representing new trading data hit either line, you would know instantly that it was time to jump in.

We don't need to construct exotic examples to see why a Windows-based graphics program can be so helpful. If you believe the Version 1.1 Presentation Manager release of the new Microsoft/IBM operating system, OS/2, is going to be widely used in your office, now's the time to learn that interface, already built into Windows Graph.

SAVING US FROM OURSELVES Some programs go out of their way to keep us from embarrassing ourselves by making ugly charts. Harvard Graphics remains the stellar example of this kind of safetynet program design, introduced in the program's first release (then called Harvard Presentation Graphics) in 1986.

Harvard incorporates many aspects of good graphic design in its basic program structure. Although you can change such characteristics as type sizes, weights and faces, colors and fill patterns, and the positions of titles, subtitles, legends, and annotation. Harvard tries hard to select, scale. and position them to look their best.

This has two benefits, one less evident than the other. The first, obviously, is better-looking output; the second is that since you don't have to worry about (or fiddle with) scaling and positioning these elements, you can get to a finished chart quite quickly.

We're also seeing a "slide-show" feature popping up in more programs. When on-screen output from graphics software was a collection of command lines and a

GETTING RID OF CHARTJUNK

ven if you're already a graphics wizard, you'll love Yale professor Edward Tufte's The Visual Display of Quantitative Information (\$34), a witty, intelligent, and eminently useful collection of tips, examples, and polemics on good and bad data graphics. No: make that especially if you're already a graphics wizard, you'll love it.

We have Tufte to thank for one of the great terms: "chartjunk," referring to that nonfunctional garbage some people use to clutter up charts, obscuring meaning in favor of what passes for decoration.

The professor has spent years gathering both good and bad examples of charts and graphs. Many come from familiar sources (Time magazine, The New York Times); others are as obscure as the French engineer C. J. Minard's wonderful 19th-century map charting Napoleon's trek across eastern Europe to lay siege to Moscow.

It's impossible to read Tufte's book without wincing at examples of ugly and confusing charts too similar to ones we've created ourselves-or without tucking away in the recesses of memory nifty tricks for explaining complicated sets of numbers.

It's also impossible to read without laughing aloud as Tufte skewers the pompous, inept, and dishonest: he pulls no punches. It would be even better if you could see the graphic he's describing, but you'll get the idea from this passage: "The addition of a fake perspective

about sequencing and presenting graphics right on the PC's own screen.

But now with the gorgeous screen displays of many of these programs, and the ubiquitous PC sitting on so many corporate desks and in so many conference rooms, building into a program the tools needed not only to create screens, but also to select, sequence, and time their display, is an

important issue for many users. With the boom in so-called desktop

to the data structure clutters many graphics. This variety of chartiunk, now at high fashion in the world of Boutique Data Graphics, abounds in corporate annual reports, the phony statistical studies presented in advertisements, the mass media, and the more muddled sorts of social science research.

"A series of weird three-dimensional displays appearing in the magazine American Education in the 1970s delighted connoisseurs of the graphically preposterous. Here five colors report, almost by happenstance, only five pieces of data. . . . This may well be the worst graphic ever to find its way into print."

Tufte presents a coherent and clearly written theory of data graphics and identifies such trouble areas as chart "noise" (moiré vibrations), grids that attract too much attention to themselves, not enough "data-ink," lying graphics, and more.

Though not specifically about computer-generated data graphics, this is one of the most important books, and perhaps the most literate book, ever published for computer users interested in charts and graphs

Unfortunately, The Visual Display of Quantitative Information isn't widely available through bookstores; you'll have to contact The Graphics Press, P.O. Box 430, Cheshire, CT 06410, for a copy. Write the company. Buy the book. Laugh till your sides hurt. Then go forth and create no more chartjunk. -Jim Seymour

larity of video projectors and PC output devices that allow projection of these presentations with ordinary overhead projectors (see "Presenting...Real-time Overhead Displays for the Big Screen," also in this issue), slide-show controls will soon become de rigueur for high-end graphics programs.

POWER-HUNGRY GRAPHICS 11 there is a downside to the boom in PC few unity stroke-fonts, no one worried presentations, and with the growing popularaphies programs and their dramatic increases in functionality and quality, it is that, as in so many other areas, only those users who have relatively sophisticated systems will be able to get full value from the software

In displays, for example, you'll want resolution and color palettes at least on the IBM Enhanced Graphics Adapter (EGA) level. IBM's older CGA-style systems work, but you won't like the results on-screen. (Some packages, such as Lotus's Freedance Plus, simply give up on color when installed for CGAs, dropping down to the CGA's moderately high-resolution black-and-white mode.)

Support for better-than-EGA resolution and for IBM's new Video Graphics Array (VGA) are becoming common in new re-leases of these peakages. Harvard Graphics, for example, supports, in addition to the usual choices, VGA, the VEGA Deluxe board's better-than-EGA resolution, and even the Tossibar T3(100's unity) but sharp 600 by 400 gas plasma monochrome disorlaw.

Newer graphics boards, such as the Renaissance GRX designs being sold by Thompson, also help by redrawing the screen far faster, thanks to graphics coprocessor chips on those boards. The leading graphics chips, Texas Instruments' 34010 and Intel's 82786, will show up on more graphics boards over the next year, making fast-writing displays a lot more common.

You'll also want the oomph of at least an 8-MHz PC AT and the fast operation of a hard disk. To their credit, some vendors of high-end PC graphics packages are now specifying ATs and hard disks as minimums for running their programs. Older PCs and XTs updated with accelerator boards or new motherboards work fine as well.

MOUSING AROUND Depending on your personal style, you'll probably want to augment that more powerful computing platform with input tools better suited to graphic design than a keyboard.

A mouse is a start; better, for many purposes, is a digitizing tablet, allowing freehand drawing and fast menu picks. Some tablet vendors, such as Kurta Corp., incorporate tablet-selectable mouse emulation, so you can use them even with those pack-

ages set up for the relative-position addressing of mice, not the more advanced absolute-position addressing of a tablet and stylus.

The new-generation PC graphics packages support a wide variety of output devices. Color plotters and ink jet printers are generally supported—but make certain your plotter or printer is on the supported list before buying.

While color is sexy, for many applications the crisp black-and-white output provided by a laser printer that supports fullpage 300- by 300-dot-per-inch output

Graphics is a classic PC application: it satisfies the criterion of empowering

the individual.

(which in turn requires about 1.5MB of memory in the printer) is more appropriaate. Producing several copies of a single graphic (or worse, several copies of several graphics) on a pen plotter is a tedious and unrewardine iob.

Relying on the graphics program's ability to substitute a series of varying crosshatch patterns in the output, in lieu of varying colors, produces results often as striking and effective as color output.

QUALITY OUTPUT Some programs work well even with relatively rudimentary dot matrix printers. It's actually hard to tell a Xerox copy of

a page of output from Harvard Graphics printed on a simple Epson or IBM dot matrix printer, for example, from a Xerox of that output printed by a 300- by 300-dpi laser printer. Antialiasing routines in these packages

work to eliminate telltale "jaggies" in type fonts and diagonal and curved lines in the finished graphics.

If you're interested in creating 35mm

program you're considering supports the slide-making device you have or are considering buying—or that it supports the graphics file format that the service bureau you plan to use expects to find on your floppy disk or coming in over its modern

and telephone line.

feelings.)

(And if you plan to mail or send those lites on floppy disks to your service bureau via overnight express, send along printouts of the graphics in your first job or two. Conversions, including those from virtual device interfaces and graphics metaflics, aren't yet nearly so rock-solid and industry-standard as they sound. Providing printouts as guidance for the way you write your sides to look will help the service buvour sides to look will help the service bu-

INTO THE MAINSTREAM Graphics is a classic PC application: it satisfies the criterion of empowering the individual—what personal computers are supposed to be about in the first place.

reau get them right the first time, saving its

time, your money, and everyone's hard

Now that PC graphics packages can match the mainframe programs' output quality and can almost match the complexity of the graphed material and the automation of the graphics-production process, we may see graphics software become more widely accepted as a mainstream PC application.

It turns out that graphics packages aren't for people with too much time on their hands at all. They're for people who don't have enough time on their hands to do things the old way.

Jim Seymour is a contributing editor of PC Magazine.

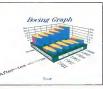
Of the Stylus graphics programs on the narter (aid of which will be reviewed in the September 27, 1988; issue), the 10rwed her represent the leading programs of the industry in quality, in marke share, and/or in potential for the finare-Boeing Graph, Chart-Muster, Ener Graphies Gallery, Harvard Graphics, Lottus Graphics Callery, Harvard Graphics, Lottus Graphics The following reviews of complement in Microsoft Chart, and Windows Graph. The following reviews of collection of the control of the concelled whether the control of the concelled review for modern tomos.

Poeing Graph

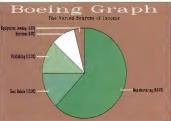
So you think your presentation graphics lack pizzazz? They' re two-dimensional and leave you kind of ...umm ...flar? Well, if that's your problem, Boeing Graph's 3-D graphics may be your solution. Not only does this program from Garison Software let you create sensational graphics with ease, you would have to work hard to make them dull.

The operative word here is spectacular. And just so you don't forget it, the program wakes up by loading the data for a 3-D bar chart and displaying it for your touch—in more ways than one. It lets you install the program, load it, and immediately start experimenting with options to modify the chart. Learning how to load data and designate rows, columns, and titles can wait until later.

Also a help in getting started quickly is Boeing Graph's simple installation procedure. You only have to run the installation program to, and follow on-screen instructions when it's time to change disks. The only other step is similarly easy. The first time you start Boeing Graph, the program asks you to identify your video card, printer, and keyboard. It then saves the settings in a confluention file.



Boeing Graph leaves the user little or no room to reale graphs that are anything less than brilliant. The program is designed primarily for 3-D graphics but features 2-D capability as well. The real customization features 4-D argulas are impressive, with an almost diffusite number of anything than the real program of the program of the real program of the real real produce for the bar chart was created using the Hewlett Peakard Paintle.



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Boeing Graph, Version 2.0 Garrison Software P.O. Box 70386 Bellevue, WA 98007 (800) 368-4555 (200) 644-6500 List Price: \$350; \$95

ofgetate or Others very specifies. ReAM, hard disk, EGA with Requires; 51 EN RAM, hard disk, EGA with In Short: A new release of a presentation graphus, program that is designed permarily for producing speciacular 3-D graphics. Beering Graph has a reasonably intitive ments structure. Its user manual, however, is only manginally helpful for learning the basics of the program, Not copy protected.

The combination of automated installation and the predefined default graphic means you can be playing with—uh, learning—the 3-D options in Boeing Graph within minutes of tearing off the shrink-wrap. After you've seen the default bar chart a few times, you can speed up louding time by thiring the Ese key to stop the chart from displaying. Alternatively, you can substitute your own sign-on dis-

play simply by giving it the default name. Unfortunately, not all of Boeing Graph is this easy to learn or use. The program is a paradoxical mixture of the simple and the complex, the intuitive and the counterintuitive. It's fully menu driven, with all choices mapped to the function keys. But the function key menus show only five options at a time, and they leave it to you to remember the other five keys.

relations the total rive uses, and the menu for only five keys is that the other five remain constant no matter where you are in the program; one backs up one menu level and the program; one backs up one menu level apparts as "keeper" that you can later undo cone is the undo key for going back to the keeper one calls up the contract site when the keeper one calls up the contract menu for redawing the screen, toggling between color and black-and white, or in-written the color scheme (black becomes

white, white becomes black).

While this makes good sense for those who have learned the program, it causes problems for newcomers. On my second

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	GEM Graph \$249	Booing Braph \$350	Ener- Graphics \$395	Hervard Graphics \$395	Microsoft Chart \$395	Wiedows Graph \$395	Freelence Plus \$495	Graph- writer II \$495	Chart- Moster \$595	Graphic Gallery S095
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Ber	•	•	•	•	•	•	•	•	•	•
Stacked her Overlapped her	0	:	:	:	:	:	:	:	0	:
3-0 har	•	•	•	•	•	•	•	•	0	0
Pie	•	•	•	•	•	•	•	•	•	•
Pie with removable stices	0	•	•	•	•	•	•	•	•	•
Ltea	•	•	•	•	•	•	•	•	•	•
Scatter	0	0	•	•	•	•	•	•	•	•
Aree	•	•	•	•	•	•	•	•	•	•
High-low	0	0	•	•	•	0	•	•	•	0
Gaett	0	0	•	•	0	0	•	•	0.	0
Organization	0	0	•	•	(drawn freehand)	0	•	•	0,	•
General features										
No. of IIII petterns	18	180	8	16	16	38	15	15	8	8
Chert legends	Auto	Auto	Auto, manual	Auto. manual	Auto. manual	Auto	Auto, manual	Auto, manuel	Auto. manual	Asto, manual
Chart lebels	Auto, manuat	Auto	Auto, manual	Auto, manual	Auto, manual	Manual	Auto, menual	Auto, manual	Auto, manual	Asto, manual
No. of eacs for data	2	2 or 3	2 or 3	2	2	2	2	2	2	2
No. ol ones that can he rolated	0	3	0	0	0	0	2	0	2	0
Manual axia centrela	•	•	•	0	•	•	•	•	•	•
No. of Images is standard image library	12	0	650	Over 100	0	42	593	0	110	467
No. of fents	2	9	8	7	12	Dependent on Windows	15	20	7	27
No. of foot sizes	6	Unlimited	Unlimited	Unimited	Unlimited	Dependent on Windows	Untimited	Unlimited	16	Untimi
Mex. no. of charts per output page	1	1	4	6	1,024	Limited only by memory	Unlimited	100	Unlimited	Unfimi
Point program copolitifies	0	 (can ax- port tries to GEM format and others) 	•	0	0	(drawing tools only)	0	0	0	•
Cut and pasts to word processor	0	0	•	•	0	•	•	•	0	•
Virtuel page capability	0	0	0	•	0	•	•	•	0	•
Predeficed formets	•	•	•	•	•	•	•	•	•	•
User-delieed formets	0	•	0	•	•	•	•	•	•	•
Cae use 8087 math coprocessor	•	0	0	0	0	0	•	•	0	0

⁻Indicates Editor's Choice -Yes -No *Achievable with Diagram-Mester

Golor	GEM Graph \$249	Booling Graph \$350	Engr- Graphics \$395	Harvard Braphics \$396	Microsoft Chart \$395	Windows Graph \$395	Freeleace Plus \$495	Lotus Graph- writer II \$495	Chart- Mester \$595 (Fresenta- tion Pack)	Graphics Gallery \$695
Max. no. of colors ne-screen	8	16	16	16	16	8	13	13	8	8
No. of colors in an-screen paintle	8	16	16	16	64	8	262,144	13	8	8
Data import										
ASCII, comma delimited	•	0	•	•	•	0	•	•	•	0
ASCII, in celumns	•	•	0	•	•	0	•	•	•	•
.DIF	•	•		0	•	•	0	•	•	•
SYLK	0	•	0	0	•	•	•	•	•	0
.WKS	•	•	0	•	•	•	•	•	0	•
.WK1	•	•	0	•	•	•	•	•	0	•
.DBF	0	O 30T	0	•	•	DDE	was.	Symphony,	0	0
Other files	None	.301	None	None	Muttiplan	UUE	WRI, PIC, CGM	Freelance Plus	None	None
Rends files directly	•	•	•	•	•	•	•	•	•	•
Data input devices										
Mouse	•	0	•	•	•	•	•	0	0	•
Pad or lable!	•	0	•	0	0	•	•	0	0	•
Documentation										
Disk tutorial	0	0	0	0	•	0	0	0	0	•
Paper Interial	•	0		•	•	•	•	•	•	•
User interface										
Help screese	0	•	•	•	•	0	•	•	•	0
Context-sensitive help	0	•	•	•	•	0	•	•	•	0
Command-driven	0	0	0	0	0	0	0	0	0	0
Mana-drivas	•	•	•	•	•	•	•	•	•	•
Balch mode	(for printing graphs)	0	•	0	•	0	•	•	0	0
File size										
Test image file (bytes) Total program size	2,805 212,060 bytes	512 1,058,653 bytes	1,981 1,534,304 bytes	1,152 961,759 bytes	1,796 882K	3,233 309K (if used with Windows)	1,928 1,028,096 bytes	5,715 1,935,360 bytes	1,152 838,025 bytes	1,155 2.75MB

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attempt to print with Boeing Graph. I spent 5 minutes searching for the menu choice to invert colors (I knew I'd seen it somewhere). I found it—on the draw menu only after looking it up in the manual. A help screen would have given me the same information, but I couldn't find the help key either.

The same duality exists in the data manager module. Importing data into the program is ax easy as reading a file in the program's native format. Select Load a friefrom the data manager menu, type the filename complete with the extension name, and hit Return. The program will automatically import files in. DIF, SYLK, .WKS, .WK1, or ASC11 formats.

Entering or changing data in the spreadsheedlike data manager is also easy. So is designating specific cells for title, subtite, and data range. However, Boeting Graph makes you use its lown arbitrary jumping designating the text for axes and data points. Row and codumn headers and titles refer to the rows and columns in the worksheet, not in the graph. And the difference between a "header" and a "title" is not at all clorr

Some of the confusion might be alleviated if the program came with a well-designed tutorial. Even a better-organized manual would help. Unfortunately, the manual is the weakest part of the package. It's a good reference guide, but only marginally helpful for learning the basics of the program.

CONTRIBUTORS

Bruce Brown is a principal of Soft Industries, a Connecticut-based microcomputer consultancy, and is a frequent contributor to PC Magazine.

Mitt Jones is a staff editor of PC Magazine.

Robbin Juris is an associate editor of PC Magazine.

Gerard Kunkel is technical art director

of PC Magazine.

Philip F. H. Rose is a project leader of
PC Labs

M. David Stone is a contributing editor of PC Magazine.

INTUITIVE MENU On the plus side, Beeing Graph's menu structure is reasonably intuitive once you allow for the commands that have been set off to the side you start with the top-level menu, or back up to it, you'll find that any command you're looking for will turn up pretty much where you expect to find it.

The top-level from lets your choose between Jew 20 and 3-by gent The tox 1 evel when Jew 20 and 3-by gent The tox 1 evel when Jew 20 and 3-by gent Jew 20 and 1 predefined formusia, ususom graphs (design your own formusis, a label manager for moving text and changing fonts). a data manager for changing data or reading in a new data file, and a file manager (for loading and saving picture files, color files, and "100-K" files to store your own, customized formats). The only function whose location isn't obvious in this

scheme is printing. It is in the file manager.

Borhing Graphi is designed primarily for

3-D graphics, with 2-D graphics thrown in
as a bonus. This bias shows in both predefined formats and customizations. For example, there are 16 predefined 2-D graph
types, as opposed to 33 for 3-D graph
types, 27 of which can be used for stacked
3-D pranhs as well.

More significant, the only way to merge multiple graphs is through menu options that are available only for 3-D graphs. This lets you merge multiple 3-D graphs on the same screen or add a 3-D graph to a 2-D image, but it won't let you merce 2-D eranhs.

The label manager also works only with 3-D and stacked 3-D graphs. But you're not giving up much here, since even with 3-D graphs the label manager is limited. It can change text size and font, but it can't add new text, delete old text, or move any text other than the title and subtitle.

The bias toward 3-D graphics doesn? these Placing Graph from producing goodlooking 2-D graphs just as easily as 3-D graphs. In either dimension you can pick a predefined type from graphic representation of the producing the program certain your graph in each the types one at a time. When scanning, the program certain you move from format to format, letting you move from format to format, betting you move from format to format, betting you move from format to format, betting you move from format to format, but you move from format to format, but you can seal with a 'you can a source and with a 'With 3-D graphs, you can also work through 16 prediction of went you graphs. Boeing Graph supports a suitably wide range of dot matrix and laser printers, with nearly 60 listed.



CUSTOM JOBS You can customize your 2-D graphs by adjusting the har width for har charts, exploding sites for pic charts, and changing the color, fine type, and patterns for the case of the partners or choose from). For 3-D graphs, you can cost customize viewing angles. You can rotate customize viewing angles. You can rotate on the control of the partners or expand each axis, "move" the graph any direction for a change in perspective, zoom in on or away from the graph, and distort the graph slage for effect.

Boring Graph supports a suitably wide range of dot matrix and later pinters, with nearly 60 listed on the printer selection menu. In tests with a Canon LBP-8II, the program worked without problems, both when installed for a Canon and when installed for an IP Laserled Plus, with the printer emulating the Laser-let through Metro Softwase's Laser-Pint package.

The program also has a menu choice for plotter support, but if you pick it, you get a message to contact the vendor. At press time, plotter drivers were still being written. But if you buy the program without the drivers, you'll be able to get them from the vendor at no charge.

the vendor at no charge.

On the PC Mougar for this rowlerge.

On the PC Mougar for this rowlerge.

Boeing Graph showed a few rough edges.

Boeing and graph edges.

Boeing and graph edges.

Boeing Graph showed a few rowledges.

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B



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in response to pressing the Esc key.

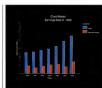
A far more important problem arose when the program created a pie chart. While drawing the chart, the program repeatedly gave up and went to DOS. The fix-provided by Garrison Software-was to move all data out of column 2. According to a Garrison spokesman, this bug affects only pie charts and is in the process of being corrected.

This last problem is troublesome but doesn't change the overall conclusion that Boeing Graph is an exciting program that produces spectacular graphics. If you can't produce a good-looking graph with Boeing Graph, you won't produce one with anything else.-M. David Stone

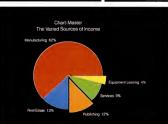
Chart-Master

Ashton-Tate's Chart-Master has been one of the most popular standalone PC graphics packages for some time, and it's not hard to understand why. The \$375 program is easy to use and dependable, the kind of dedicated charting package you want to have around when you need to generate a chart 15 minutes before a meeting but also need to look like you've been

FACT FILE Chart-Master Ashton-Tate 20101 Hamilton Ave. Torrance, CA 90502-(213) 320-8000 List Price: \$375; Premium Pack tincludes 31/5and 5%-inch disks L\$395; Masteroraphics Presentation Pack (includes Chart-Muster, Segn-Master, Diagram-Master), \$595 (with either 51/e or 31/einch disks). Requires: Chart-Master: 192K RAM: Presentation Pack: 384K RAM; two disk drives thand disk recommended): DOS 2.0 or later. for allow to the of the prospects of FC increases graphics, Chart-Master cams points for case of use but comes up short on features, enhancements, and laser printer support. A reduction in price, the addition of a 3-D effect, and a broader range of file formats readable by its insport facility would make this intelligently designed package more competitive Not copy protected. GMOON READER SERVICE CARE



Although Chart-Master may be a winner in terms of simplicity, clarity, and printer and plotter support, it loses points for its high price and lack of 3-D effect. However, the number of text options available is a plus: the user can select any of eight fonts, 16 sizes, eight colors, italics, justification, and underlining. The 35mm slides of the charts pictured here were produced with a Selco CFR 8000 film recorder.



prepared with chart in hand for days.

Much of Chart-Master's reputation was built on the fact that even if you didn't use the nackage for a month or two, you wouldn't have to spend much time getting reacquainted with it before you felt like you'd used it only yesterday. That hasn't changed, but the competition has. By itself, Chart-Master can only take you so far: it lets you produce the standard bar. line, pie, column, scatter, and area charts that have always been synonymous with PC business graphics, but not much more. When Decision Resources, Chart-Master's developer and the company that Ashton-Tate acquired in 1986, was riding high, that level of functionality was enough to earn the package a large share of the market. These days, however, an equivalently priced package like Harvard Graphics gives you organization charts. word charts, and a host of special features. some of which you won't get even if you shell out \$595 for Ashton-Tate's Mastergraphics Presentation Pack, a trio that comprises Chart-Master, Diagram-Master, and Sign-Master.

When you compare the price of the Mastergraphics Presentation Pack with the cost of purchasing the packages separately-Diggram-Master with 51/4-inch disks costs \$345. Sign-Master \$245, and prices for versions with both 51/4- and 31/2inch disks are \$20 higher-the Presentation Pack looks like a good deal. But when you compare the price of the hefty boxed 4

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set with that of Harvard Graphics, and when you consider that Emertonics Research recently shaved \$200 off the price of its true 3-D graphics package Ener-Graphics (\$395) and that Chart-Masser can't even add a 3-D effect to its charts, both the Presentation Pack and Chart-Master as a standalone come up short.

SIMPLE AND CLEAR Chart-Master and company lose points when judged on price versus features, but the packages score high on simplicity and clarity, two of the criteria that are often used to evaluate the effectiveness of graphic images. Installing the package on a hard disk is straightforward, requiring that you create a new subdirectory, swap three disks, and answer a series of questions on successive menus about the hardware you'll be using with Chart-Master. If you select the color option from the Graphics Display Installed menu, for example, Chart-Master can automatically detect the existence of an Enhanced Color Display.

What you'll be left with after installing the program is Chart-Master's main menu, which offers nine selections, intending Create a Chart, HotPreview a Chart, Edin a Chart, Stoer Rerneve Delete a Chart, and the Daugarbber, Chart-Master's importing facility. The Installing procedue for the Persentation Park is no more complex, but you'll have several more disks to eye yet you'll have several more disks to eye yet you'll have created as well as a master ment from which to select each Master package.

Each of the nine items on Chart-Master's main ment is followed by a series of fill-in-the-prompt submenus. If you choose Create a Chart, for example, you'll have to fill out eight of these input screens to see your chart to completion, methodically adding such data as the tile of your chart, the axes labels, the method of entering data, the number of variables and observations as well as their labels, and finally the data itself.

Because Chart-Master asks you to enter data in a nonvisual text format and refers to the categories (such as sales or profits) to be plotted as variables, and the points (such as years or months) at which the variable values are seen as "observations," you may find that your first attempt at cre-

ating a chart yields unwanted results. However, Chart-Master does assist you by automatically generating the succeeding month names, years, or numbers for observations if the first observation label you've entered in the chart is a month, year, or number.

Once you've entered the data, the chart is complete, and Chart-Master returns to its main menu. From there you can select Edit a Chart and then Verify a Chart from the edit menu to ensure that you've entered the data correctly, or you can select

While such a special effect as 3-D is really a secondary tool, its absence from Chart-Master can only be viewed as a flaw.



Plot/Preview a Chart to send your chart to an output device or see it on-screen. It's when you choose the latter option that you call up the plot submenu. from which you specify the kind of chart—clustered bar, stacked bar, scatter, line, ple, area, and mixed—you want produced. The chart can then be displayed on-screen using either the monitor's highest resolution or one of two medium-resolution modes.

Chart-Master is strong on dot matrix printer and plotter support, and Appendix A of its user manual includes individual instructions for connecting 28 plotters to your PC. In addition, the package supports three film recorders-the Bell & Howell CDI-IV, the Hewlett-Packard 7510A, and the Polaroid Palette-so that you can turn your charts into 35mm slides. Although you'd be hard-pressed to find a plotter that Chart-Master doesn't support, you wouldn't have to tax your memory to think of laser printers-both PostScript and non-PostScript-that won't fit the bill: Chart-Master supports only the Hewlett-Packard Laserlet series II

NO MOUSE SUPPORT Although your choice of alternate input devices supported by Chart-Master is even more limited than your choice of laser printers-that is, you can use only a keyboard-this shouldn't present any problems: Chart-Master doesn't have freehand drawing either. Where the lack of mouse support does become a handican, for example, is in Diagram-Master, which features a freehanddrawing component called the Drawing Board for creating customized diagrams. If your alternate input device of choice is a light pen rather than a mouse, then Diagram-Master won't shackle you to the keyboard, because the package does let you use that device to make menu selections and move and size shapes on the Drawing Board.

If Chart-Master doesn't give you much in the way of alternate input device support, it gives you plenty in the way of fexpoints. Along the bottom of the screens, where you enter titles and labels for observations, variables, and axes, a strip of six ext options appears that lets you choose any of eight fronts, any of feight colors, and or defining. Among the available type styles is a symbol font, which assigns 94 frequently used forost to the keyboard.

In addition to adjusting text options, you can alter the appearance of your chart by working your way through the appropriate portions of nine pages of options, which let you change the defaults for such elements as hatching patterns, linetypes, and the location of the chart on the page. If the results you can achieve by adjusting combinations of these options can only be described as subtle, that's because the one enhancement that should be specifiable here-a 3-D effect-is missing. While it's true that such a special effect as 3-D is really a secondary tool for adding emphasis, its absence from an otherwise intelligently designed package can only be viewed as a

Also missing from Chart-Master is a way to directly import Lotus 1-2-3 .WK1 and .WKS files, and that's a shame because the package's Datagrabber is one of the easiest importing facilities you could use. To import a 1-2-3 spreadsheet, you'd have to use the Lotus Translate Utility to translate voting into a DIP file, which is



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one of the formats that can be read by the Datagrabber. Importing a (BASE_DBF file would also require an extra step, this time to translate the database file into an ASCII file. In addition to .DIF and ASCII files, the Datagrabber can also read SYLK files and can graph either all or part of the data in the spreadsheet.

As a member of the inaugural group of PC business graphics packages, Chari-Matter earned its share of loyalites largely because of its simplicity, because it worked well, and because its features and the same of the But with the advent of true 3-D graphing, the introduction of spreadsheet packages like Excel that have much improved graphics capabilities, and prices getting more in line with reality. Curu-Matter is among the too to ten—Robbin Juris among the too to ten—Robbin Juris ...

EnerGraphics

EnerGraphics, Version 2.2, from Enerronics Research, is for those who take their graphics seriously. Like other programs, EnerGraphics can quickly produce a simple pic-fair or bar chart using default settings, but with a small investment of time and effort it will produce a far more eye-catching result. And it literally adds a new dimension to most charts by letting you draw them in your choice of two dimensions or three.

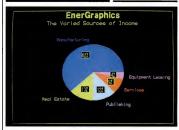
EnerGraphics's 3-D capability is certainly its most exciting feature. Simply by choosing the 3-D option on the print menu, you can convert a dull 2-D bar chart into an interesting visual. Add further customizations, and you can produce a truly striking graphic.

The 3-D output puts EnerGraphics in rare company, and it invites companison to Boeing Graph, the 3-D graphics program that was originally sold as Perspective and is also a module in Enable. Depending on your point of view, EnerGraphics either scores well or poorly in that comparison.

EnerGraphics is comparatively weak in 3-D features. Unlike Boeing Graph, which offers a variety of 3-D graph types, a choice of predefined viewing angles, and the ability to reste the viewing angle. EnerGraphics limits you to a line chart, a bar-



EnerGraphics sparts a weath of opinion for users who need to saller their graphs, as well as a well-their graph as the saller and their graphs are supported to spread graph their process. Users can take advantage of the program's insprint predigined program in their predigined programs. From their control their programs is the desired for their prediging supports the Pokarish Potente Plus film recording-which created the 33mm dides of the bar and pie-charts shown their charts shown their charts shown their created their charts shown their created their graphs.



chart, and an angled view of a pie chart, with no choice of viewing angle. (According to an Enertronics spokesman, the abilty to rotate the graph will be added with an optional module called Kaleido-Chart.)

Making up for a lack of 3-D variations is a wealth of other options, many of which are not available in Boeing Graph. Predefined formats include more choices than I could comfortably list here. Within bar charts alone, the formats include vertical bars, horizontal bars, multiple bars, multiple overlapping bars, stacked bars, and mixed bars and lines. Bar charts can also have single or multiple scales.

Adding still more flexibility to predefined formats. EnerGraphics can combine features in almost any combination that

makes sense. For example, the program can draw 3-D multiple bars horizontally or vertically. There are also some combinations that the program won't let you use. It won't, for example, mix bars and lines in the same 3-D chart.

Very much on the plus side, Ener-Graphics is not limited to predefined formats. Menu-driven choices let you customize the scale or scales for the graph, choose the color and pattern for each data set, adjust the chart size, add a frame around the graph, and choose the color for the frame.

RICH IN SYMBOLS Even better, a graphics editing feature lets you add lines of any thickness and color, as well as your



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choice of 99 symbols. The symbols range from boxes for highlighting text, to arrows, to simple line drawings of computers, Roppy disks, cars, trains, jet planes, and the like. You can choose the position, size, and color for a symbol. If you change your mind later, you can adjust the size or color, move the symbol elsewhere, or delete it entirely.

The graphics editor can also modify text. The data entry screens include room for a title, two subtitles, and a "source" line. The predefined formats put the title and subtitles at the top of the graphic and the source line on the lower left. With the graphics editor, you can modify these lines or any other text on the screen

The graphics editor can change the font, text size, color, position, and the text itself. It can even rotate text so it is written on an angle, rather than parallel to the edge of the screen. And if you want more text than the predefined format allows, the editor lets you add new text. It also lets you delete text that is laready there.

The EnerGraphics merge function can merge up to four charts, and control their positions and sizes on the merged graphic. This gives you complete control over the format, letting you overlag charts or show them side by side. You can even use one graphic on a full screen and embed the other in the side of the side. You can even use cone in it. This is particularly useful for creating a full-screen text graphic with smaller charts embedded in white spart.

For all its features, EmerGraphice is remarkably easy to learn and use. Part of the secret is a well-designed mix of nested menus and direct keyboard commands. For example, from the top-level menu of the chart module, you can save, delete, or mead a file, show a directory, give the command to draw a chart, go directly to the merge editor, go to the printer-plotter-camera menu, or go to the chart-editing

Equally important is the use of custom screens for each kind of chart. When you create or edit a chart, EnerGraphics first saks for chart type—pie, bar, line, or text. If appropriate, it also asks the subcategory (for example, a line chart can be normal, highdow, high/low/close, or error). It then presents a data screen designed specificality for that type of chart. When you print or view the chart, the program offers a list of



print-time choices that is also tailored for that chart.

FUN TO EXPLORE Working with En-Graphics is like exploring a large mansion and finding pleasant surprises in each nook and cranny. In fact, it's like exploring two mansions: the program also includes a drawing module suitable for building technical illustrations, floor plans, and the like from an assortment of predefined graphics primitives.

The EnerGraphics manuals are as well designed as the program. A beginner's guide includes tutorials for creating pie, line, bar, and text charts, and for merging charts. The reference manual fills in details glossed over in the tutorials.

Installation is trivial and is covered on the first page of the addendum to Version 2.2, where you can't miss it. You simply put disk I in drive A:, type "install a c", and follow the directions to change disks.

On the PC Magazime error-handling tests, Energi-phics performed well. It gave an appropriate error message in each case and recovered without losing data. It didn't perform quite as well on the printer tests. It thought it was printing when the printer was turned off, which can cost time. It also froze the system when the primter was viff-line, thought it recovered easily enough and started printing as soon

as the printer was put back on-line.

EnerGraphics supports a wide variety of printers and plotters, including dot matrix and laser printers. In printing on a Canon LBP-8II using Metro Software's LaserTwin to emulate an HP LaserIet Plus. EnerGraphics not only produced crisp clean output but automatically substituted patterns for colors on the black-and-white printer.

The one important failing of Enerfraphics is its data import feature. The program will import. DHF files and comadelimited ASCII files, but the process is clumby at best. In both cases it imports is clumby at best. In both cases it imports have to nun through the data manually, itelling the program which numbers go in what have to nun through the data manually. ——specially shore, but have to retype all text anyway. In most cases I/I or date start text anyway. I

EnerGraphics is clearly a good choice for those who are dissatisfied with mindless, preformated graphics. If you want to control the way your chart looks, and you have at least a modicum of graphics design sense, EnerGraphics may well be your program of choice.—M. David Stone

Freelance Plus

Do you use business graphics programs but know you could do better with pen and ink? Do standard graphics packages almost meet your needs—but not quite? Are you an able designer looking for a tool to help you save time creating graphics, charts, and images? If you answer yes to any of these queetions, you ought to take a look at Lotus Development Corp.'s Freelance Plus, Version I.O.

Freedance Plus is a general-purpose 4595 graphics package that combines several functions to let you create various types of charts, pepphace, Figures, Saphes, Figures, Supmensions. You can portray in two dimensions. You can combine and modify the basic building blocks—line, rectangle, circle, polygon, bowa arrow, silce and text—in an infinite number of ways. The program date includes a number of design table volves, foots, fill patterns, and a symbol library.



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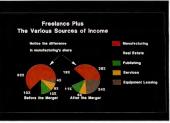
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Freelunce Plus has an automatic Installation program. All you have to do is select the subdirectory in which to put the program files and designate the printer, ploter, or other output device you will use. If your hardware configuration matches the default setup (BIM Color/Graphics Adapter), everything else is done for you automatically. You can easily change the hardware configuration any time by selecting Setup from the initial Access meeting.

scup iron inc initial Access menq. The Prefuer Plies manuals are well written and organized and contain a separate reference section, a full index, and two tutorial sections. The first tutorial provides a functional overview of the program, taking you from start to finish through a number of different operations, such as creating, modifying, and saving a drawing. The other tutorial covers the main commands in the outer they are listed in the program menus. Context-sensitive Finalized Page
The Various Sources of Income

Authority

Makers of business charts may find that Preclauce Plus provide is them with more power than they can ever use. With Freelance Plus users can embellish their charts with forts, symbods, designs, figures, signs, and anything else that can be portrayed in two dimensions. The program's 1-23-style means make it easy to use, and the manuals are well written and organized. The pie charts displayed here were produced with a Matrix (Dec R Jim recorders)



FACT FILE



Freelance Plus, Version 1.0 Lotus Development Corp. 55 Cambridge Pkwy. Cambridge, MA 02142 (617) 577-8503 List Prior. \$105

Requires: 5128 RAM: hard disk drive; CGA, EGA, Hexnels-Camphic; Card or compatible; VGA with PSC2; DOS 2.0 or later. In Short: Freedome Pho is an extremely adoptable and Betwide graphics pusckage that includes many design tools. With it you can easily create simple business betwide, design necess-emplex give exhabitions; or lead-online existing charts and graphics. Not copy protected. on-line help is also available at all times.

Freelance Plus is fairly easy to use. It employs Lotus 1-2-3-style moving-bar

employs Lotus 1-2-3-style moving-bar menus to make functions available to you, with pop-up menus for presenting options within a function. For example, you select the file-importing option from a bar menu, then choose the imported file's format from several listed in a vertical pop-up menu. Freelance Plus also makes use of the function keys. For moving around the screen to select, position, or otherwise manipulate graphics elements, you can use the cursor keys, a mouse, or a graphics tablet. The freehand-drawing function works best with a mouse, however; trying to sign your name in cursive writing with cursor keys is virtually impossible.

FLEXIBILITY Among Freelance Plus's many functions is creating datadriven charts. You can do this in three ways; manually put in the graph, text, and data choices and values; import graph files from the supported formats (1-2-3 and Symphony, Graphwriter, dBASE, SYLK, ASCII, and Metafile) and then zoom in on and separate, copy, or change sections any way you wish; or use Freelance Plus's Chart Form option to fill in heading, label, legend, and value data. Freelance Plus can automatically create only a limited number of chart formats (line, bar, pie, and scatter), but you can customize all of these. You can also manually create any other type of two-dimensional chart. Although this last option takes more work, Free-

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970 Kings Highway West, P.O. Box 550 ● Southport, CT 06496 (203) 255-1526 ● Telex 964300 ● FAX (203) 254-7271 CIRCLE 155 ON READER SERVICE CARD lance Plus is particularly good at such custom-created chart types as organization and flow charts.

Not only can you create symbols or designs in freshand or use or modify the graphics building blocks provided, you can also access the 60 symbol libraries that come with the program, each library consisting of up to 20 symbols. Many of the libraries have blank spaces where you can up your own symbols, such as a company logo. Lotus also sells map libraries containing different types of geographic and physical information, and furly symbol litrom blirt-arety vendors.

For producing text elements, the program provides 15 standard fonts that you can slant, thicken, or scale in an unlimited number of sizes. Using the symbol library facility, you can create your own fonts as

Freelance Plus provides full support for a wide variety of dot matrix and laser printers, plotters, and film recorders. It can display or print up to 13 colors on one page, offering a choice of up to 262,144 colors on a high-end multicolor VGA adapter and monitor.

Freelance Plus's batch plotting facility lets you select up to 36 previously created Freelance or Graphwriter files. You can specify a set number of copies and the device on which to print the files. Since you can call different lists, it is possible to have an unlimited number of image combinations ready for printing at any time.

Freelance Plus should meet all of your charting, drawing, and designing needs. If all you want is simple business charts. Freelance Plus will do the job, but it may provide more power than you can use. If you regularly need to print a set of business charts linked to spreadsheets and databases, Freelance Plus is a workable option, but there are easier alternatives-such as Lotus's Graphwriter II. with its 24 standard chart types, data linking feature, and Autochart batch function. If you are a heavy Graphwriter II user but want to customize charts further. Freelance Plus can be a design editing tool. Although it requires some effort on your part for anything but standard charts, Freelance Plus ultimately gives you the tools to do whatever you want .- Bruce Brown

GEM Graph

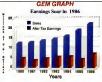
As charring programs go, Digital Research's GEM Craph, Version 2.0, is simplistic. Simplicity, however, is this program's strength As a GEM Desktop Publisher application program, GEM Mac-like windowed operating environment. This S249 program is easy to use and easy to understand. Seasoned GEM usen will glide easily from meast on meast, and newcomers will find the interface intacomes to shove and you need high-quality comes to shove and you need high-quality toupta, GEM Graph may not be the one

for you.

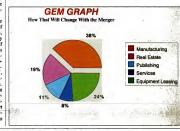
If you are starting off as a Digital Re-

search GEM user, the GEM Graph installation could not be simpler. GEM Destaop is included with the package and must be installed for the application to operate. Then all you need to do is slip the Master Applications disk into drive A: and execute the GEM Graph install file from GEM Desktop.

MAC-LIKE INTERFACE Once you're inside the GEM window, all of your files are displayed as file folders or boxed icons, much the same as in the Macintosh operating environment. Application programs in the GEM environment reside in a directory called Gemapps, which is displayed as an icon rather than a file. Upon selecting the Gemapps icon, you're preselecting the Gemapps icon, you're pre-



GEM Graph in a great program for converting dut to graphic form in quick and easy way. The program at a quick and easy way. The program at strength it in its simplicity grant fraigh has limited chart types and modification options, users in search of more features would do well to consider using Digital well to consider using Digital consider using Digital Team. The 35mm sider of the charts shown here were produced with a School CFR 0000 film recorder.



sented with a new set of files and application icons. Fortunately, the icons do not stand alone as cryptic messages sent from the program creators-the program name appears directly below each symbol.

GEM Graph supports the most common data file formats, including Lotus 1-2-3's .WKS and .WK1, as well as .DIF and straight ASCII. Unfortunately. though, labels and data are treated equally when imported. That is to say, both are dumped into the GEM data worksheet. Since you cannot define labels from the worksheet, you must cut and paste them individually into their appropriate label cells. This becomes a nuisance, especially when you cut and forget to paste before your next cut-an error that will send your cut data into the netherworld.

GEM Graph offers a reasonable number of chart types from which to chooseeight, including the basic graph, bar chart. pie chart, and stacked bar chart. One exceptional feature is the inclusion of U.S. and European maps for charting purposes. You can import data as regional or statistical information. Although you can add labels to any of the chart types, they are fixed in format and little can be done to alter them graphically.

Among the user-definable chart features are color and pattern. When using an EGA for your display adapter, you can access eight on-screen colors. There are also 18 predefined patterns to choose from

GEM Graph.

Version 2.0

60) Gurden Ct

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FILE

These are immediately accessible from the GEM Graph Toolkit, a menu of chart-editing and enhancement options including color, pattern, line weight, and type styles and sizes. There's also a selection of 12 images from a small library that's included with GEM Graph. These include some common business images-a factory, a crate, a car, a ship, a man, and so on. They're rendered mostly or entirely in black and white, with some incorporating a spot of color that you may select from the eight-color palette. Your axis, grid, and scale can also be manipulated.

LIMITATIONS GEM Graph's morenoticeable limitations include a rather sparse offering of font options. It allows only two font types and six font sizes, ranging from 10 to 72 points. The available font styles are the standard bold, regular, italic, and underlined. On the positive side, changing a font type, size, or style is quite simple. Using the pointer, mouse, or keyboard, you first select the desired type and change the font attribute in the menu. The program then redraws the chart type you chose, incorporating the new font attribute.

The GEM environment provides more than just an intuitive screen display. A separate output module controls the application program's output, GEM Graph will let you produce slides with the Polaroid Palette film recorder and supports five Hewlett-Packard plotters, as well as the IBM 7372 plotter. The printers it supports include the Apple LaserWriter, the HP LaserJet Plus, most Epson printers, the IBM Color Jetprinter, and the Xerox 4020 Color Ink let

GEM Graph's limitations far exceed its features. However, in some applications, less is more. The limited colors, chart types, and font sizes and styles mean greater throughput to the graphic image. If your primary concern is to see your data in a reasonable presentation, without the overhead of a full-blown graphics package, then GEM Graph is for you. With all of its shortcomings, GEM Graph is still a great program for converting your data to graphic form in an expedient way.

If you are looking to create word charts,

contains GEM Graph, GEM WordChart, GEM Draw, and a library of graphic images, GEM WordChart produces just what you would expect: word charts. Word-Chart is identical in structure to its graphing relative and is therefore also easy to use. GEM Draw is a vector-based drawing package, not a paint package. Once again, GEM users should feel comfortable moving from one package to the next while using GEM Desktop. Files are compatible across the GEM family and can be imported to the GEM Paint bit-mapped paint program for pixel-by-pixel manipulation. The Presentation Team lists for \$500-a saving of more than \$250 over the combined list prices of the individual packages it contains.—Gerard Kunkel

Graphics Gallery Graphics Gallery, from Hewlett-Packard

Co., is actually two products-Charting Gallery and Drawing Gallery-grouped as one \$695 package. Charting Gallery, which sells separately for \$295, is marketed as a full-featured business graphics package. The \$395 Drawing Gallery is meant to add those little extras you may want. That's the idea behind Graphics





Hewlett-Packard Co. 3000 Hanover St. Palo Alto, CA 94304 (800) 367-4772 (415) 857-1501 List Price: \$695.

Bought separately: Charting Gallery, \$295, Drawing Gallery, \$395. Business Management Portfolio, \$95. Requires: 384K RAM, two disk drives thard

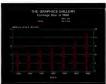
disk recommended), mouse, Hercules or IBM-compatible graphics card, DOS 2,0 or In Short: A presentation graphics package that comprises Charting Gallery and Draw

ing Gallery, Graphics Gallery lets you produce high-quality graphics but with a considerable amount of effort. A clumsy user interface, poor integration of features, and a slightly odd approach to business graphics make the package difficult to learn. Not copy CHICLE 801 ON READERS

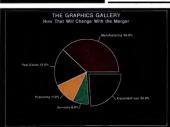
diagrams, or images, consider the Presentation Team offered by Digital Research. It

disk recommended), graphies adapter, DOS In Short: GEM Graph is a simple-to-use, simple-to-understand business graphics package that runs in the GEM Desktop environment. Great for a quick graphic look at your data. Not copy protected. ROLE 605 ON

■ BUSINESS GRAPHICS SOFTWARE



Charting Gallery is capable of high quality output, and with the addition of Drawing Gallery the package's flexibility is impressive. However, Charting Gallery's user interface is rather clumsy, and its features are poorly integrated; even mastering the program cannot fully alleviate the user's frustration. The 35mm slides of the charts shown here were produced with a Hewlett-Packard 7510 film recorder.



Gallery, anyway. In reality, Charting Gallery offers much too little to stand on its own and, to put it bluntly, is about as much fun to use as a jackhammer.

Hewlett-Packard divided Charting Gallery into three sections, each dealing with a separate type of chart. Unless you own an HP Vectra, which includes HP's PAM user interface, you start the program differently depending on which type of graph you'd like to create. If you want to create a pie chart, for example, you type "pie" at the DOS prompt. Similar rules apply for creating bar and line charts.

This oddity would be somewhat forgivable if you could at least switch between modules once you're in the program. But of course, you can't. If you decide you want a bar chart instead of a pie chart, you have to save your data, exit "pie," run "bar," and then reload your data.

Once within any one portion of the program, the menu-driven interface also leaves a lot to be desired. The interface ranks among the most counterintuitive I've come up against. It's difficult to put your finger on exactly why an interface is counterintuitive. But when you find yourself accidentally exiting to DOS time and time again and having to return to the manual to find functions that should be easy to spot (there is no on-line help), you can be sure the interface isn't exactly intuitive.

For all its deficiencies, however, Graphics Gallery does boast a few nice features, although even most of these take a slightly offbeat approach that you may or may not appreciate.

For example, you can load Lotus 1-2-3 files without specifying data ranges or changing a single byte of your worksheet data. But the procedure actually loads a named 1-2-3 graph and then presents the corresponding data instead of letting you import the full worksheet directly. I found this feature easy and convenient to use once I grew accustomed to it, but I didn't like the way the data transferred to Graphics Gallery; instead of laving out the data as it was organized in 1-2-3, Charting Gallery displays each range as a column. The columnar display makes perfectly good sense and is easy to work with, but it does result in a bit of confusion if you are more accustomed to the row-oriented approach of spreadsheets.

The data entry and editing screen in general is not difficult to use, but neither is it intuitive, powerful, or graceful. For instance, you are limited to ten columns of data and 640 rows. To view columns 6 through 10, you have to hit a function key or click the appropriate menu option with your mouse instead of simply scrolling over one column at a time.

You can trim the amount of data you want to graph, but the methods for doing so make little sense. For instance, you choose the range of rows you want graphed by marking the first and last row of a continuous range. So far so good, although you can mark only one such range. To specify the columns you want graphed, you mark the columns that you don't want. one at a time. This type of inconsistency is what counterintuitive interfaces are all about.

The data entry and editing screen

makes no provisions for sorting, switching, or transposing rows and columns. Once you've managed to get your data the way you want it, it's fairly easy to draw and label the graph. Charting Gallery does a nice job of choosing the default colors

from its palette of eight, and changing graph colors and fill patterns is a breeze. You can enter a title, a subtitle, footnotes, and axis labels into boxes the package opens up for you on the screen. This makes entering the text easy, and the final product looks very nice, but you can't move any portion of the text to a different







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location. If you want to move the text, your best strategy is to delete the fixed-location text and create an annotation, which can be moved at will. You can change the color of text, but not selectively: all text displays in the same color.

The same holds true for text size and font; you can choose any of three text sizes in either a standard or bold font, but you must change all the text at once. The text will be a different size depending on its purpose—title, subtitle, and so on—but each piece of text maintains a specific size in relation to the remainder of the text.

DRAWING GALLERY Now let's go to Graphics Gallery's better half. Drawing Gallery fills most of the gaps of Charting Gallery and adds a score of features that typical business graphics packages lack.

by pictal business graphics packages tack.

Drawing Gallery retains the functionkey menu style of Charting Gallery, but
the program also adds a few icons and
menus on both sides of the screen.

You can import .GAL files into the package from *Charting Gallery* or import files and graphs from other programs, as you would in *Charting Gallery*.

Once pulled into Drawing Gallery, chars created in Charting Gallery lose all their limitations. You can relocate all text, selectively change fonts and font sizes, selectively change text color, and much more. You've got your choice of 27 fonts that can be resized on-screen at will. You can also add bullets to text, align text in several different ways, and even rotate text at an angle.

Whereas Charting Gallery limits you to one graph per screen and output page, Drawing Gallery gives you a virtual page—equal to the largest size of paper your plotter or printer is capable of handian onto which you can load a number of graphs.

of graphs. Drawing Gallery stops short of being a full-featured paint program; you can't paint the screen as if you were using a brush or even draw squiggly lines free pand. You can, however, insert several geometric shapes into your drawing and draw other shapes from line segments. You can also stretch, shrink, and move objects by pulling hem with the cursor, and you care. full shapes with colors useder patterns. ALL TOGETHER NOW Viewed as one package, Graphice Gallery deem's lack the competition, when comment due competition. In fact, Drawing Gallery gives the program a flexibility that few packages can match. It gives you more-than-respectable control over your graphs and supports an excellent range of output devices, as you would expect in a package from Hewlere Packard.

Along with the charting and drawing packages, you also get an impressive clipart library with hundreds of images that you can load into *Drawing Gallery*. Additional image libraries are also available.

All in all, if generating the highestquality output possible is your only concern, Graphice Gallery may be the best choice for you. But be prepared to endure a too f fustration before you feel at home with this package. Its clumps user interface, poor integration of features, and slightly odd approach to business graphics make it difficult to learn and not all that pleasant to use even once you get the hang of it—Mitt Jones.

Harvard Graphics

After using Harvard Graphics for about 55 minuses, you might be tempered to slip its documentation back into its box and store it on one of the higher shelves in your bookcase: the powerful \$359 package is that eracys to use. But if you did so, you'd be missing out on some of Harvard Graphics's most useful features: design tips and suggestions that will help you shape, politically the store of the property of the store of the property of the

straight line.

Harvard Graphics does what any good business graphics package should do; it lets you get from a rough to a finished product in a hurry, requiring only that you cad the manual's prologue to learn how. This section—so brief that Software Publishing Corp. I sechnical writers didn't even call in a chapter—leys out the steps you must lake to produce the charts that you must lake to produce the charts that the produce the chart that the produce the pro



book, which is a collection of templates that you can use to create preformatted charts. Even if you follow the most complicated routine that's outlined here, you'll have to complete only five steps to see

your data in graphic form. Of course, if you want to create morecomplicated charts or learn how to write macros, you'll have to invest a little more time and read beyond the first ten pages of the manual. Without much ado, the package also lets you produce organization charts, as well as such variations on bar and line charts as normalized charts, histograms, bar/line combination charts, cumulative charts, point charts (scatter plots, scatter charts, and scattergrams), area charts, dual-y-axis charts, paired bar charts, logarithmic charts, and high/low/ close charts. If that list represents more choices than you know what to do with, check out chapter 5, which has a handy table that matches chart types with what they are intended to show. You could find that you do need to plot that dual-y-axis chart with logarithmic scaling, if only to satisfy your curiosity to see how it looks.

SURPASSES PREDECESSOR The ability to do logarithmic scaling and to generate org charts and normalized bar and

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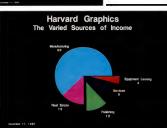
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Almost all things to almost all people. Software Publishing's new incuramino of the former Harvard Presentation Graphics is simple to use and sports many new features. In addition to a screen-show feature for presentations, Harvard Graphics offers or guantization charts and word charts, a number of variations on but and line charts, and a freehand-drawing facility. The charts shown here were produced with a Matrix OCR Z. film recorder.



area charts is in part what distinguishes Harvard Graphics from its predecessor, Harvard Presentation Graphics. A good example of how far PC graphics programs have come over the last few years, Harvard Graphics succeeds at being almost everything for almost everyone. Building on Harvard Presentation Graphics's solid foundation, Software Publishing added a number of important features, among them a library of 92 symbols, any of which can be used to stylize a "word chart" or graph; a freehand-drawing facility, which lets you either annotate a chart with arrows, circles, polygons, and other shapes or draw a chart from scratch; and a screenshow feature, replete with fades, zooms, and wipes, which is great when you want

to present a series of charts on a largescreen color monitor.

Although those are Harvard Graphics's more eye-catching additions, some new workaday features will probably help you just as much, especially if your idea of fun isn't having to retype data that's already stored in spreadsheet and other files. Not only does the program work with more output devices and monitors than before, but it can also read data directly from an ASCII file that's less than 256 characters wide or from a delimited ASCII file. To import an ASCII file, all you have to do is choose a text or graph chart type, select the Import/Export option from the main menu and the Import ASCII data from the Import/Export menu, pick an ASCII file to

import from the Select File screen, set your options for reading in data, and either press PIO to see the filled-in sext claim form or specify titles and legends for a graph and temp press PIO to import your data. In addition, the second of the second of

The package's designers have gone even further to shore up its import feature by establishing a tighter link between the program and Lotus 1-2-3 and ASCII files. That's achieved through the creation of a data link, which connects the 1-2-3 or AS-CII file from which you import data to a template. The logic of creating such a connection is obvious: if you use a 1-2-3 or ASCII file often, chances are you'll want to create a template to display that information in a consistent format; if you update that data, you'll still probably want it displayed in the same way. By creating a template for either a 1-2-3 or ASCII file and then saving a data link, you can have Harvard Graphics automatically import data from the appropriate file into the template, thus saving you the trouble of respecifying your importing and charting op-

tions. But before you try your hand at importing 1-2-3 files, you need to become fairly expert at manually creating charts. Fortunately, that doesn't take very long to do. Harvard Graphics is as easy to use as it is to install. To run the package on a harddisk system, all you need to do is run the installation program (Install) on the utilities disk, answer the questions that appear on your screen, copy the two program disks and one symbols disk onto your hard disk, and create a directory in which you'll store your chart files. In addition to the four 51/4-inch disks just mentioned. Harvard Graphics also comes with two 31/2inch disks-a program disk and a symbols and utilities disk-for users who have suitable systems.

MAIN MENU To start the program, just type HG and press Enter. Doing so will bring up the main menu, from which you'll select such functions as create a new

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chart, edit a chart, draw/annotate, ged/save/remove chart, import or export a file, change setup defaults, and produce output. To choose any of those options, use the Spacebar or cursor keys to highlight the desired function and then great pitch the desired function and then great fire first fiting you need to do, that option is, incupárfully, already highlighted when the main menu appears on the several. At the main menu appears on the several, At chart by pressing F2 or call up context sensitive belo by reessing F2.

Every time you create a new chart, Harvard Graphics applies its default setup options for orientation, border, and font, causing the chart to appear in landscape mode without a border and to use the Executive type style for labels and titles. If you prefer portrait mode to landscape, or if you wish your chart to have a single- or doubleline border or to display text in square serif, roman, sans serif, script, or Gothic type styles, you can change the default settings for the chart you're working on by pressing F8 at the main menu. A menu of current chart options will then appear alongside the main menu, and you can amend your chart by tabbing to the option you wish to change and pressing the Spacebar. Although Harvard Graphics allows you to use only one font per chart, you can enhance your text by combining attributes like bold and italies. You can also put up to six charts on one page and customize their layout, which was not possible with Harvard Presentation Graphics.

As you enter data into the data form for a pic chart, for example, you can also indicate which slices, if any, should be exploded. That's one way of emphasizing the importance of a particular slice, but there's another as well, instead of just exploding, say, one slice from a pic chart and leaving it at that, you can create a column chart showing the constituents of that slice and then link the two in the same file.

It's also at this stage that you can add a 3-D effect to your jee chart by pressing F8 to bring up the two-page Pie Chart Titles and Options form and then changing the 3-D effect option from no to yes. (Unlike Boeing Graph and EnerGraphics, Harvard Graphics a lacks a third axis with which to plot data; it uses 3-D solely as an effect that adds visual interest to a chart

rather than as a means of expressing a relationship among data.) Among the other options offered by this menu are rotating a pic or pies so that slice labels don't overlap, changing the size of a pic or its slice labels, and displaying the value of a slice below or next to the slice label or inside the

With options abounding and an easyto-use menu structure, Harvard Graphics rightfully earns its place among the masters of PC graphics packages. Over time and with extended use, you'll only find that its value appreciates.—Robbin Juris

Lotus Graphwriter II Lotus Development Corp. has designed its

\$495 Lotus Graphwriter II. Version 1.0, primarily as an automated charting system. The package has enough power to produce up to 100 charts on a single command—each with its own selection of fonts and styles and each extracting any necessary information from external files.

You must be equipped with a hard disk to use Graphwriter II effectively. Running this program on a dual-floppy-disk machine would require such extensive disk swapping as to make it impactical. A fast microprocessor is also recommended (although Graphwriter II will run on 8088based computers), as well as a high-resolu-



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(617) 577-8500 List Price: \$495 Requires: 512K RAM, hard disk drive, DOS 2.0 or later.

In Shorts Carphoriter II is an easy-to-use, forms-oriented, business charting program. While it won't let you cell for early your congraph syles, a offers 24 standard chart types and facilities for inhang to spreadsheat and database data. This should prove a powerful tool for most routine applications. Not copy protected.

tion video adapter and monitor.

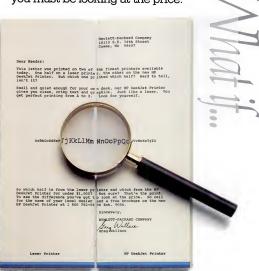
Installation is a simple matter of answering a few on-screen questions about your computer system and following prompts to insert various program disks. The install routine automatically copies all the files you need to your hard disk drive. All the information necessary for installing the program and configuring your hardware is provided in one of the manuals, which also includes a 70-page tutorial. Graphwriter II doesn't come with a diskbased tutorial, but the program is so easy to use that this isn't necessary. A second manual serves as a reference volume, and both books have extensive indexes. You also get a quick-reference card and a variety of keyboard templates.

Graphwriter II uses both 1-23-style horizontal moving-bar menus and vertical pop-up menus. You select functions and operations from the moving-bar menu, while the pop-up menus present setting and style options. The program also makes extensive use of the function keys, often with the same key assignments familiar to 1-2-3 users, such as FI for help, E5 to go to a specific location, and P9 to view a chart.

Graphwriter II's selection of 24 chart types is quite adequate for most business data charting. It produces the usual line. bar, pie, x-y, and area charts, and it offers other interesting types as well. You can create organization and bubble charts, and you can generate Gantt charts to display project task scheduling. For making bulleted lists or signs, you have a text chart option that allows up to 48 lines of text. You can't create 3-D charts with Graphwriter II, although an optional 3-D effect adds perspective through shading. Up to four charts can be printed or displayed at one time. You also have a lot of leeway in choosing fonts and other stylistic options. but the number of options doesn't overwhelm you, as it does in some other graphics programs.

FORMS ORIENTATION To create charts in any of the formats available with Graphwriter II, you provide the necessary information by filling in several screens of forms. The first form includes heading, title, and comment information. The second form contains information about graph types, levends, and labeline, You enter the

If you can see the difference, you must be looking at the price.

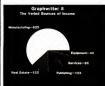


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Lotus Graphwrite II is best steed in an application that produces the same charts regularly from changing data—a prime qualification for high-volume production environments. The program's selection of 24 chart types includes organization and bubble charts as well as Genit charts or display project sails scheduling. The pie charts shown here were produced with a Martix QCR-Zflam that is linked to data ranges in spreadsheets or databases. You can specify named ranges or even use graphics settings previously determined in a worksheet file. If you change the spreadsheet or database contents later, charts produced with the Data-link feature reflect the changes automatically.

AUTOCHART Graphwriter II provides another level of automation with its Autochart feature. This lets you create lists of up to 100 Data-link or regular chart lists of the viewed, printed, plotted, or exported to be viewed, printed, plotted, or exported to be rogram formatis en masse. You save each list of charts in a separate file. Autochart even allows you to run a list fit from command at the DOS prompt. Autochart must Graphwriter II automatically and cither prints, plots, or exports each chart on the list, depending on the chart settling.

A practical use for Autochart might be to produce weekly sales performance charts for sales personnel. After each week's sales that is emered into spread-sheets that tally a given salesperson's weekly and running average performance, Autochart can automatically provide a graphic representation of current and historical information.

While Graphwriter II's strength lies in its forms orientation, that's also its major limitation. If what you want to do isn't provided for on a form, or if there is no suitable style option on a pop-up menu, then you're out of luck. There is also no freehand-drawing or painting capability. You cannot put text or labels anywhere you want or annotate a chart freely with Graphwriter II-you must use the specified designs. If you want to edit the style of a Graphwriter II chart, you have to use another program-such as Freelance Plus, another graphics package from Lotus. In practice, though, most business users will find the chart types they need in this pro-

gram.

Overall, Graphwriter II is an excellent charting program. You'll get the most from it in an application that produces the same charts regularly from changing data, but it's also easy to see for creating a simple consultance of place from the confluence of the chart. Since you can put together a chart just by following simple on-screen instructions for filling in forms.



data in the third form. The F8 key toggles you from one form to another. A packet of 25 blank printed paper forms is included, which can serve as a hard-copy reference for chart specifications or as input forms for data entry oersonnel.

Graphwriter II's design and input forms are dynamic. Whenever you make a change in one item, related items on the same or other forms are changed as well. For example, if you specify that you want to create two separate pic charrs—one with five sitees and the other with eight you're presented with two areas for entering values, each with the correct number of plank value lines. If, on the other land, you are putting in duta for a bur chart and enter values for more items than you had

originally specified, the program accommodates your changed intention and readiusts the design.

While it's simple to enter data from the keyboard with Graphwriter II, the slickest method is to let the program extract the information it needs from other files. Graphwriter II can import files from Louss 1-2-3, Symphony, Freelance, and dBASE III, as well as files in .DIF, SYLK, and ASCII formats.

The package's Data-link feature allows you to set up and preserve links to spread-sheet or database files. You can set a chart up so that it derives its heading, label, legened, comment title, and value date from an external file. Thus a Graphwriter II chart file can become like a bie header file

Every presenter wants to make a compelling, persuasive case. And color, you'll agree, makes all



the difference.
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memorable. In short, color makes any desktop presentation more effective. And research proves it.

All you need is a Hewlett-Packard ColorPo Plotter like we used here, or the HP Paintle Color Graphics Printer. Together with a PC—IBM compatible or Apple Macintosh—you can use all the popular graphics software like Lotus Freelance Plus, Cricket Presents, HP's Graphics Gallery (used below), Microsoft Chart and Harvard Graphics. At under \$1,300, the HP ColorPro-Plotter may be just where you want to start. It will turn your ideas into colorful, sesy-to-grasp visuals 0. If you need to combine near-letter quality text with color graphics, you can rely on the large graphics, you can rely on the large plant of the plant of the plant of the under \$1,400. Whichever you choose, you'll create desidop presentations

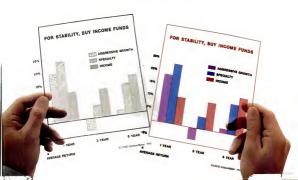
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Graphwriter II is appropriate for the casual user as well as for the more accomplished chart producer who needs to automate periodic graph production.—Bruce Brown

Microsoft Chart

One of the founding fathers of presentation graphics programs, Microsoft Charlis facing stiff competition these days. Improvements over the years have keep the \$395
program among the most powerful, sutother packages are coming on strong to
their packages are coming on strong to
the
features and capabilities absent from this
old-timer. Three important ornissions
come to mind are Charl's lack of Hewiter
Packard Laserte fort support, drawing
apabilities, and batch printing mode à la
Lona Graphwiter
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and Graphwriter II.

Chart gives you virtually complete complete Chart gives you give his be only after you're expands be to only after you're explored its many menus and options. Because Chart's extensive menu system is complete and not as intuitive as it tracking down the item that you want to be tracking down the item that you want to be complete. The chart's contract sensitive help, always a mouse click or a keystrew to help, always a mouse click or a keystrew help.

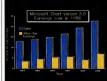
FILE Microsoft Chart. Version 3.0 Microsoft Corp 16011 NE 36th Way Box 97017 Redmond, WA 98073-9717 (800) 426-9400 (206) 882-8080 List Price: \$395; workstation pack, \$195; upgrade from any previous version, \$75. Requires: 320K RAM, one disk drive. nics adapter card, DOS 3.1 or later. In Short: One of the old-timers of presentation graphics programs, Microsoft Chart lacks HP Laserlet font support, batch pro-

cessing, and drawing capabilities. It is still,

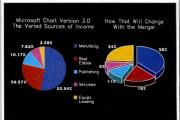
however, a powerful package, with great

non-Windows mouse control and exter data analysis work. Not copy protocopy

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Microsoft Chart works well as an analytical tool with a full set of analytical functions available. Although the program lacks Hewlest-Packard Laser-lest frost support. drawing capabillities, and batch printing mode, the program's mouse implementation is excellent and expedites all facets of use. The 35mm allides of the charts displayed here were produced with a Matrix PCR film records.



of power once you have mastered it.

Although Chart is not designed to run under Windows, almost all its operations can be executed via a mouse. The mouse implementation is excellent, allowing point-and-citick control of most graph elements. And because there are so many elements to control, modifying a chart is a more formidable task when you attempt it without a mouse.

Chart supports all common graph types, including high/low charts (although high/low charts do not have the option of a third "close" data point). In contrast to the text-based menu system, the package's chart "gainery" serves as ar excellent visual guide while you create your chart. After selecting from visual crossnations of

the basic chart types, you are then presented with examples of options from which to choose. For example, after clicking on a box that contains a column chart, you are shown six boxes containing column charts with such enhancements as overlapping stacking, value labels, and 3-D effect. While the predefined formas cannot be combined in the gallery, it provides a good starting point from which to fine-tune your chart.

chart. Although Chart doesn't offer drawing tools or clip art, it affords you total control over labels, the boxes enclosing them, and the arrows firing from them. Text in the program can'te displayed in one of four typefaces, with some combinations of bold and italic, deending on what is available.





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EDITOR'S CHOICE

Boeing Graph
 Harvard Graphics
 Lotus Graphwriter II

Although the field of 3-D graphics packages is limited to two out of our top ten-Boeing Graph and Ener-Graphics-both were strong contenders for Editor's Choice. Ener-Graphics deserves praise for its graphics editor, which lets you modify text by changing its font, color, size, and position. Boeing Graph may not offer you that degree of fine-tuning, but for the sheer number of 3-D graph types it supports, for its range of predefined rotations and viewing angles, and for the ease with which you can create spectacular-looking 3-D graphs, Boeing Graph is the clear choice.

Graphics was an Editor's Choke for its easy-to-see most recture, its easy-to-see most recture, its commanding plotter control, and its support of numerous film recorders. This year, Software Publishing corp. recaptures to the twist with Navasa Graphics, a new and improved version that builds on HVO's strengths. Among the Features that distinguish Harvas Chaphics, from distinguish Harvas Chaphics, from the Compilers from the Compilers of the Com

Last year, Harvard Presentation

ty; and its screen-show feature.
Those enhancements, plus ease of
use and support of all the chart
types you could possibly want, make
Harvard Graphics one of the best
dedicated charting packages you'll

find.

Like Harvard Graphics, Lous Development Corp. 's Lotus Development Corp. 's Lotus Corphwriter II has a logical and intelligent user interface. It also main-tailing the same and database links and lets you use charring templeates to automatically move updated information from spreadtheets into graphs while maintaining consistent formats for those graphs. And then there's the package's ability to produce up to 100 of those graphs with a single com-graphs with a single com-graphs with a single com-

graphs with a single command—each with its own fonts and each extracting data from external files. If you're looking for a PCbased production tool that attempts to match the automated data-retrieval power of mainframe graphics packages, look no further than Lotus Granbwriter II.

An honorable mention goes to Windows Graph, a natural choice for desktop publishers, Windows users, and DDE (dynamic data exchange) pioneers.

on the device being used. Text in certain forest and so be fitted any angle, On the other hand, it's hard to believe that Microst still has provided no way for Chart to use the HP Lascrlet's internal fonts and fon cartridges. That's unfortunate because with the fonts supplied, HP Lascrlet only and the fonts supplied, HP Lascrlet only the fonts with the fonts supplied, HP Lascrlet only the fonts with the fonts supplied, HP Lascrlet only the fonts with the fonts supplied. HP Lascrlet only the fonts with the fonts of the fonts with the fonts w

you're planning to use an HP or HP-compatible laser printer rather than a film recorder, plotter, or dot matrix printer to produce your output, this is a serious handicap.

DEFINABLE LINNS. Chart can maintain upon is hardly better-looking than where looking than where looking than where the choicing than where the data formats, such as a 1-2-3. WKS file. There is Posts file to the early 1980. There is Posts for the April 1980 file to the link, including the link incl

chart, it will be updated with the new data autorasically. There are limits to this fragile link. Owing to its after-the-fact connention, it cannot know if you change the location or size of the data series. Chart's external links are not as powerful as'the DDE feature in Windows, which allows Microgarfs. Waldows Grapha and liverself. Even't to provide hot links to other programs for constant updating. It is, however, the best that can be done in the hostile world of DOS.

Chart can assume the role of analysis tool as well as that of

a presentation graphics package.

_

Chart can assume the role of analysis tool as well as that of a presentation graphics package. Once data has been brought into the program, a full complement of analytical functions are available. These tools let you perform statistical analyses such as moving averages, standard deviation, and regression. Also under the analvsis rubric are handy functions to find the percentage of total; to create a running total; and to perform addition, subtraction, multiplication, or division between two data series or between a data series and a constant. In all cases, Chart creates a new series containing the results. The original data is unharmed. You can then incorporate the new data series into a graph in any way that you choose. This feature helps you manipulate the data and flip between data and graph without having to return to a spreadsheet package in between.

Hidden in Char's otherwise thorough and easy-to-use manual is an explanation of its Load Format command. With this command, you can pull in a previously generated chart format and apply it tourent data. You can easily produce a set of personal preference files for standardized graph outgar. Titter is, however, no facili-







Unretouched Photo

Buy The One On The Left And You'll Have To Put It Where The Sun Don't Shine.



The monitor on the right, however, can be placed anywhere you like. Even in direct sunlight. It's the new Flat Technology Monitor from Zenith Data Systems—winner of PC

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THE QUALITY GOES IN BEFORE THE NAME GOES ON*

ty that lets you apply these formats automatically and output the results to a list of data files, as you can do with *Lotus Graphwriter II*.

Still a powerful package with great non-Windows mouse control and extensive data-analysis tools, Microsoft Chart seemed absolutely amazing a few years ago. Indeed, the power and ease with which you could modify graphs went a lone way toward making the nackage a welcome addition to the business toolbox. One can only hope that the next upgrade will bring it up-to-date with HP LaserJet font support, batch processing, drawing capabilities, and other features offered by the competition. Otherwise it may well fade into the background behind Micrografx's Windows Graph, Lotus's Freelance and Graphwriter II. and Microsoft's own Excel.-Philip F. H. Rose

Windows Graph

Packages designed for the Windows environment get an automatic leg up in the areas of ease of use, graphics, and input/output device support. Since these are also important for presentation graphics, Windows Graph from Micrografts, has profited from this association. But judged on the other key element essential to presentation

Micrografx Windows GRAPH

Formery Soor in 1986

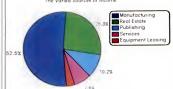
Allors Tollors 1985

Tol

Changing fonts, colors, and ather attributes of a chart via a mause couldn't be simpley with Windows Graph. All that's required is that you point and click a the abject and select a pull-down must be a spreadabeet, making data ernry and modification streadabeet, making data ernry and modification streadabeed and familiar. The charts that are shawn here were produced with a Phosametric 200 VS attached ta a Video Show 164.

Micrografx Windows GRAPH

The Varied Sources of Income



3.4%

FACT FILE



Windows Graph, Version 1.0 Micrografx Inc. 1820 N. Greenville Ave. Richardson, TX 75081 (800) 272-3729 (214) 234-1769

Richardson, TX 75081 (800) 272-3729 (214) 234-1769 List Price: S395 (equires: 512K RAM, two disk drives (hard

disk recommended). Window-compatible graphics card, DOS 20 or later. In Short An Impossive product for a 1.0 version, this easy-to-ency puckage for the Windows environment encourages you to experiment with the design of your graphs but is not as feature-frienh is it might be. It remains to be seen whether Version 2.0 will be able to stand up to the challenge posed by the graphics protion of Microsoft Excel. Not copy protected.

CROLE MIZ ON READER SERVICE CADO

Although Windows Graph has most of the major features you'd expect to find in a powerful presentation graphics package, it lacks some of the Isseer items, such as the abilities to tilt text and to link in ittle lakels from a data file or anywhere else. In fact, don't spend time looking for a reference to tittle in Windows Graph's minimally adequate manual: the concept of titles in nowhere to be found in this package. All labels, except those for series and category manuses and the original value lakels, are manuses and the original value lakels, are

graphics packages-the ability to create

the best possible output-the \$395 pro-

gram, in its present form, falls short of the

lead.

You can work around these deficiencies, but you'll have to do some extra timeting. That, however, couldn't be easier. To add an unattached label using a mouse, for example, all you need to do is select the text tool, click where you want the text to appear, then type. Typeface, size, and location can be changed afterward. Because it's so easy to manipulate the elements in the graph, it's likely that you'll take more

creative license in designing your visual.

To change foms, colors, and other attributes, you must point and click at the object and then select a pull-down menu of
options. To move an object on the screen,
whether it is a text label or the entire graph,
just point at the object, hold the mouse button down, and drag. An outline of the ob-

RAMQUEST RYTEA

8749 (512K)

Extend Orchid's Lead in Memory for Your PS/2 Every so often, technology changes and a new leader emerges. In moving from the AT to the PS/2 users have established Orchid's RamOuest" as their leading choice in memory boards. Since its introduction as the first add-on for the PS/2, more PS/2 owners have come to trust RamQuest than any

Two New RamQuests

other board. Tens of thousands are in use. Now Orchid announces its second generation of RamQuest to carry on the tradition of simplicity 2nd value RamQuest II's and RamQuest Extra"

Two Inexpensive Boards to Choose From

RamQuest II is the least expensive way to add memory to your PS/2 It comes with I megabyte of memory, but costs less than other brands with no memory. You can expand to 2 megabytes using inexpensive, readily available DIPs for less than \$200. You can't get a better deal

RamQuest Extra accommodates up to elabt megabytes of memory and it comes with two

serial ports at no additional cost. That standard feature would cost extra on other memory boards. Adding memory is a snap with either 256K or 1MB SiMM panels, which you can easily mix and match. And both boards are comeatible with EMS 4.0 and OS/2.

Installs in Minutes

RamQuest Extra · 0 to 8 MB of memory • 2 serial poets - FREE · Supports ENS 1.0 4 (8/2 For PS/2 models 50, 60, 4 as

Besides being the cost and performance leaders, the RamQuest boards are also the easiest to install. Each just four keystrokes. Other brands make

you run lengthy installation programs that take up to a half hour. Or they make you modify your IBM reference disk, which may cause compatibility problems later.

Ease of Installation Chart

	Cer;566	AST.	Quadrate
# Key- Strokes	- 4	50+	90°
S/W Installation	Automatic	Maneul	Mateal
Software Required For Installation	iBM Disk Only	Modified IEM Disk	IBM Disk + Driver



RamQuest II

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You already know Orchid as the leader in Accelerators. Now more and more PS/2 owners are making RamQuest their memory choice. If you need an inexpensive way to upgrade your PS/2, choose the name that more people trust: Orchid's RamQuest. See your dealer or call 800-638-3322 to place your order.

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■ BUSINESS GRAPHICS SOFTWARE

ject follows the mouse cursor, showing the current location. When it's where you want it, let go, By grabbing a side or a corner of the object, you can just as easily resize or scale it. Although it's easy to use Windows Graph without a mouse, it's strongly recommended that you use some kind of pointing device.

After you have linkered with your graph and put logether a pleasing combination of attributes that you think you might and to use again, you can save your choices separately from your data. Windows Graph let you build a collection of graph templates, with your favortic color and graph type combinations, ready to be called up whenever necessary. I found it unfortunate that these can be treated only as unattached labels and are not saved with the templates. An ersult, it is impossible to prepare data beforehard, import it, and create a finished garph without manual increase if mished garph without manual Windows Graph lets you build a collection of graph templates, with your favorite color and graph type combinations, ready to be called up.

Rather than the usual data series method of entering and displaying graph data. Windows Graph employs the spreadsheet metaphor. With column and row display, and simple functions such as sorting, column/row totaling, and basic arithmetic functions, Windows Graph gives you some of the power of a real spreadsheet program. There are no formulas, Still, the spreadsheet arrangement is a familiar one and makes it easier to examine and modify the data.

DDE VITERACE With Version 2.0 of Windows Graph, you'll have an alternate with the work of the work of

50 DESKTOP ORGANIZERS.



dows products, should make this real in the near future.

Other planned enhancements should take care of the package's current lack of titles and sideways text as well as its inability to save labels with formatting in the template folder.

EXCELS EXCEL Future releases aside, it's hard not to compare Windows Graph with Microsoft Excel. While Excel is a spreadablest program, its graphics section is one of the most powerful you'll final. which is section is one of the most powerful you'll final. which will be a section of the section of the Windows Graph has, but it also has the windows Graph has, but it also has the lift you use Excel as your spreadabect, then your graphs: can till be actively linked to your graphs: can till be actively linked to your data. You get all will be actively linked to your data. You get all you for a price that, at \$450.5, group \$3 flots nor when that of \$450.5, group \$3 flots nor when that of \$450.5, group \$450.5.

Still, Windows Graph is better than Ex-

Windows Graph offers enhanced drawing tools and page composition capabilities and provide complete

provide complete control over size and placement of objects.

I in a bunch of ways. It offers

cel in a bunch of ways. It offers several features that Excel does not, such as its enhanced drawing tools and page composition capabilities, and provides complete control over the size and placement of ob-

jects in your graph. Even if you use Excel as your primary spreadsheet package, you might consider Windows Graph useful for filling in where Excel leaves off. If you already have a spreadsheet package and aren't interested in switching to Excel, and if your graphing requirements are more visual than data-intensive, then Windows Graph is a solid choice.

Windows Graph was the only show in town for a short while if you wanted a presentation graphics software package that ran under Microsoft Windows, and it showed the way of the future. It is an admirable blend of the easy to use and the powerful, even if it is sonewhat limited compared with its peers.

With the introduction of Microsoft Excel, it has a real challenge. An impressive product for a 1.0 version, let's hope that Micrografx's Windows Graph stands up to Excel with Version 2.0.—Philip F. H. Rose

-rnmp r. n. Rose

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Beyond Native Memory:

erely a few months ago, more than a megabyte of memory was superfluous. DOS and most applications rarely ventured past the infamous 640K addressing limit. Beyond that barrier was terra incognita, a land of a few standards with about an equal number of advocates.

With the introduction of OS/2, however, the memory issue has changed dramatically. Even a megabyte is no longer enough. To take best advantage of IBM's newest operating system for computers based on the 80286 microprocessor, 2MB is just the starting point.

The AT-class Models 50 and 60 now have enough market presence to make third-party vendors willing to design Micro Channel add-in boards. And it's a good thing they do, because those machines by themselves don't have sufficient native memory to take a good stab at running

Add-in memory is the answer, of course. IBM has offered an additional pair of megabytes since the Models 50 and 60 were introduced, in the guise of its IBM PS/2 80286 Expanded Memory Adapter/A, a 2MB slide-in board for those two PS/2 models.

The compatibles industry has not iagged far behind. Almost as soon as the refinements of the new Micro Channel data bus were understood, a number of companies began working on other memory additions. The boards reviewed here represent the first results of their design efforts.

Add-in Boards For PS/2 Models 50 and 60

If you want your PS/2 Model 50 or Model 60 to be successful at running OS/2, you'll need to boost the memory of those machines to at least 2MB. Here are seven add-in boards that will let you accomplish that and more. ALL THE SAME In many ways, these boards are the same. After all, they are designed to solve the same problem: the insufficiency of standard solid-state storage in the Models 90 and 60. To fill that need, all include the ability to handle at least MB of RAM, with one (IDEAssociates' IDEAmax/MC) stretching the single board limit to 12MB.

Because they have to fit into the conines of the Models 50 and 60 and match the Micro Channel bus, all the boards are similar in size—the IBM-mandated 12½inch length and 4-inch height—and most use IBM-style blue plastic mountingprackets-cum-handles. And all must somehow deal with IBM's new PS-2 Programmable Option Select (POS) scheme

to be recognized by their computer hosts. From those common beginnings, these boards wander in their own directions. Despite the general tendency to use single inline memory modules (SIMMs) and surface-mount Components, some manufacturers cling to their old ways and continue to use ordinary DIP (dual in-line package) discrete memory, othps and proprietary memory daughtereads. To pack proprietary memory daughtereads. To pack some verdors have even added even some verdors have even added even some verdors have even added even panel.

BET HEDGING All of the manufactures or so these memory add-ons known that not to reserve the server of these memory add-ons known that most one to OS2. To hedge their best and make known their products useful even to those who their products useful even to those who might never take the big leap to a new operating system, many are packaging their products with their own utilities to give the purpose to that RAM. Typically, they may include a disk enulator and a print spooler.

Drivers for the Lotus/Intel/Mercooft expanded memory specification serve as another hedge, allowing the extended memory provided by these boards to work as expanded memory with the applications as expanded memory with the applications. J-23, Reclase 2, 1884's Micro Channel Architecture has built-in facilities for bank witching—the principle behind EMS. Although ostensibly designed to patch around memory banks that go bad, this bank witching; can be controlled by diversible and the provided of a deficient EMS board. EMS has evolved since its initial introduction. As of this writing, only one board manufacturer, STB Systems, has caught up to the latest EMS revision, Version 4.0, although other manufacturers reported that they would soon be offering users similar drivers.

If you're thinking of using expanded memory, the performance of a board's EMS emulator will be important to you. It is a major determinant in how fast your EMS applications will run. If you're just planning to work with OS/2, however, you can ignore the performance of EMS emulators because it has no bearing on the speed of the operating system.

ISSUES AND ANSWERS Your first consideration in buying a memory enhancement board for your Model 50 or 60 is how much RAM you need. The IBM PS/280286 Expanded Memory Adapter/A gives you a 2MB dose on one board. That's enough to get started with OS/2.

You may want more RAM, perhaps someday pushing your system to the full 16MB 0572 limit. Although most PS2. memory products allow for such growth, some make it easier than others. For instance, you can't fill a Model 50 with 16MB by using boards with a maximum capacity of ZMB each. The Model 50 simply doesn't have enough sides to accommodate that many boards. In any case, to remodate that many boards, in any case, to remodate that many boards, in any case, to result that the LOMB limit you'll need at least 18MB should suffice the outcome.

Neither the RAMdisk nor the print spooler is necessary if you have OS/2. Those facilities are included with the operating system. You'll want EMS support only if you plan to use software that takes advantage of it. Once OS/2 gets rolling, you probably won't want to bother with EMS, but in the interim it could prove valuable.

If you want to take advantage of EMS, consider carefully the memory board you'll use because the speed differences among products can be dramatic. For OS/2, most boards rate about the same because they simply provide more of what's already in your system. The only nonconformist is STB Systems' RapidRAM 2, which clearly rates as the product of choice for performance.

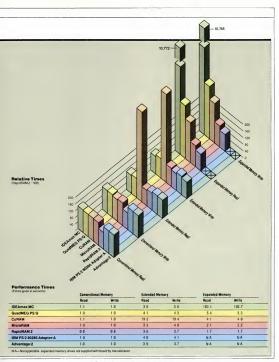


A is even add-in memory boards were 2 model by PC Labs on the same PS 2 model by PC Labs on the same PS 2 model by PC Labs on the same PS 2 model by PC Labs on the same PS 2 model by PC Labs on the same PS 2 model by PC Labs on the same PS 2 model by PC Labs on the same PS 2 model by PC Labs of the Same PS 2 model by PC 2 model by PC

The Conventional Memory benchmark test allocates 256K of conventional memory and treats it as e series of 64-byte records. Then, 16,384 rendom records are read into and written from this memory.

The Extended Memory benchmark test allocates 258K of extended memory and treats it as a sense of 64-byte records. Then, 16,384 random records are read into and written from this memory.

The Expended Memory benchmerk test ellocates 256K of expanded memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory.



AST RESEARCH INC. Advantage/2

One look at the Advantage/2 and you'll understand why the SixPak Plus, from AST Research, was long the top-selling multifunction board for PCs. Like its fore-bear, the \$495 (with 512K RAM) Advantage/2 is a quality product, superbly engineered and executed.

neered and executed.

The backbone of the Advantage/2 board is an array of eight sockets for SIMMs, arranged in two sets of four. These sockets accommodate either 256K or 1MB memory modules. Both sizes of SIMMs can be mixed on a single Advantage/2 board, provided that the two chips that compose each of the sets are identical in size.

in size. The various possible arrangements of SIMMs allow one Advantage/2 to hold from 0 to 8MB in half-megabyte increments, with only 5, 7, and 7½MB capacities not being possible. Two Advantage/2 boards will fill a PS/2 to its full 16MB canacity—one with 8MB, one with 6½.

ADVANCED TECHNOLOGY The Advantage/2 leaps beyond today's technology with its ability to operate without wait states—that is, if the board has been



Advantage/2 AST Research Inc. 2121 Alton Ave. Irvne, CA 92714-4992 (714) 863-1333

List Price: \$495, with 512K, with 2MB, 5995

Requires: PS/2 Model 50 or 60. In Short: A high-quality, well-designed memory board for the Model 50 or 60 that goes beyond the state of the art by operating without wait states when equipped with fast SIMM.

ORAL 606 ON PLACEMENT CANO. equipped with sufficiently speedy SIMMs: 100-nanosecond 1MB or 80-nanosecond 256K modules.

Unlike STB Systems' RapidRAM 2, the Advantage/2 cannot bless its host PS/2 with zero-wait-state operation, however. Its waitless operation is reserved for future PS/2-style computers that operate without wasts in their native modes.

You switch between zero- and onewait-state operation as part of the Advantage/2's configuration process. The board is fully integrated into the PS/2 setup scheme with its own device identification numbers, one for the main board and two others for the daughtercard options.

Before you physically install the board, you copy the Advantage/2 setup information to the bost system's configuration floppy disk. Then you run a single program (Prepare), install the board, and finally run the IBM configuration software. After automatic installation, you set the number of wait states used with the IBM manual setup process.

Besides the setup software, AST Research includes its SuperPak software with the Advantage? 2. Two primary utilities are provided—a RAM-based disk emulator and a print spooler—as well as a menudriven installation program to set up the necessary drivers and CONFIG.SYS file on your boot disk.

Inexplicably, the Advantage/2 package lacks an expanded memory driver. All of the board's memory is normally assigned to the extended addressing area. Thirdparty software must make it function as exranded memory.

On the hardware side, the design and construction quality of the Advantage/2 rate as the best and most advanced of the products reviewed here, surpassing even IBM's own board. Its only shortcoming is software, both for putting its zero-wait-state power to use and for using its RAM endowment for expanded memory.

CUMULUS CORP.

CuRAM

CuRAM, from Cumulus Corp., is close in concept to an old-fashioned PC multifunction board but is technologically PS/2 all the way. Although mostly made from advanced surface-mount chips and fully inte-



CuRAM Cumulus Corp. 180 Basswood Cleveland, OH 44022 (216) 247-2236

List Price: 2MB board, \$995; 2MB module, \$595; 4MB board, \$1,995; 4MB module, \$1,495; serial and parallel port module, \$149; 2,400-bps modem module, \$445.

Requires: PS/2 Model 50 or 60 in Short: A memory expursion bound for the Models 50 and 60 that features good performance and hardware support for the enhanced expunded memory specification (FFASS).

hanced expanded memory specification (EEMS).

CPCLIF 895 (IN PEACER SERVICE CARD)

grated with IBM's Micro Channel Architecture and POS, the \$995 (with 2MB) board includes both memory and input/output options much like those of a PC board.

The CuRAM card itself operates mostby as a Micro Channel interface by providing space for the installation of three modules (that is, daughtercards). Two mounting positions are available for memory cards, and one is available either for an impulcouptu adapter (5149) flat will add both an extra serial and parallel port or 2,400-bit-per-second modem (5445).

Memory modules come in two capacities, 2MB (\$595) and 4MB (\$1,495). Configurations supported by Cumulus allow add-in RAM of 2, 4, or 8MB in a single expansion slot.

Each memory card contains 64 memory chips, with 32 directly soldered to each side of the module

The modules attach to the main board through a header-and-socket arrangement, with a wide, double-row header on one side and two three-pin headers in the two opposite corners. The spacing of the boards is determined solely by the inser-



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80386

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tion depth of the headers into their mating sockets, and other than the insertion friction produced by the pins, no other means of securing the module to the main board is provided.

UNCOMMON SETUP Setup, however, can only be considered unusual. You can set the maximum amount of extended memory that you want using the IBM configuration program. But you have few options—either 2MB with your selection of two starting addresses or no extended memory.

By using a special Cumulus program, you can distribute whatever memory that is not assigned as extended during the IBM installation between expanded and extended memory. The only restriction is that you must make splits in blocks of 16K.

After testing the board, your best strategy becomes clear. If you want extended memory for OS/2 or some other purpose, avoid using the Cumulus expanded memory procedure and allocate everything to extended memory using the IBM procedure. Dividing up the RAM with the Cumulus driver imposes a severe performance penalty on extended memory, slowing it to about one-fifth of its potential speed.

Dividing memory also slows the operation of expanded memory to a rate of 180 80 percent of the performance of an Intel Above Board in a PC AT. When you've vote all RAM to expanded memory, the CuRAM memory board operates more consistent of the performance of the performance down is caused by the use of an extra of the memory emulator—another device driver—when the CuRAM RAM is not assigned to the extended memory are aunder the IBM configuration procedure.

For getting both extended and expanded memory from the CuRAM, Cumulus recommends using its 4MB board, which requires no device driver for the memory split.

The Cumulus installation program also

allows you to set up part of the added Cu-RAM memory as a print spooler and to assign a DOS device name to the parallel port (or serial port). The instructions are brief—almost too brief—but understandable by anyone who is somewhat familiar with the PS/2 line.

The CuRAM board is well made and

earns a top recommendation as an addition to your PS/2—provided you want nothing but extended memory. And its optional I/O features will be welcome in a Model 50 with its scant expansion area. Its built-in hardware support of EEMS makes it the top choice if you run programs written to that standard. You'll want to avoid its poorly performing extended memory emulator, however.

IBM CORP. IBM PS/2 80286 Expanded Memory Adapter/A

The official offering from IBM Corp. is the standard by which all others are judged, and the IBM PS/2 80286 Expanded Memory Adapter/A rates as a high standard indeed. The design of the \$1,295 (with 2MB) product adheres to the original conception of the PS/2 and virtually defines the implementation of IBM's Micro Channel Architecture.

Standard equipment on the adapter includes 2MB of RAM comprising eight 256K SIMMs. Each SIMM has three metal-cased proprietary RAM chips, which are virtually identical to those in the Model 50 system board SIMMs.

The entire wealth of components on the adapter, save two ICs, consists of surface-





IBM Corp.
Consult your local authorized dealer.
(800) 447-4700 (for dealer information)
List Pricer \$1,295, with 2MB.
Requirers: PS2 Model \$0 or 60.
In Short: The standard memory-only expunsion adapter for the Models \$0 and 60 that
adds 2MB of extended memory.

mount chips. The layout is "machine fastidious," rigorously conforming to the PS/2's design.

The only mechanical deficiency is the blank option-retaining bracket on the rear of the card. While other manufacturers securely screw this bracket onto their products, IBM is content to rivet it loosely in place. It's a workable but uninspiring approach.

Unlike other PS/2 memory boards, no software disk accompanies the IBM product. You don't need configuration information because all the required data has already been incorporated into the PS/2. You set up the memory adapter quickly and simply by using a copy of the host computer's Reference Diskette.

All of the board's 2MB automatically becomes extended memory. Although the IBM memory adapter does not include an EMS driver, IBM acknowledges that the board will support EMS with the appropriate user-supplied software, RAMdisk and print spooler utilities come with IBM's OS/2, so there is no need to include them with the memory board.

As should be expected, the memory on the IBM PS/2 80/286 Expanded Memory Adapter/A performs identically with PS/2 system board RAM. The adapter just provides more of the same. For OS/2, that's all you need.

IDEASSOCIATES INC.

IDEAmax/MC

With its 12MB maximum memory capacity, the \$495 (with 512K RAM) IDEAmax/MC, from IDEAssociates, packs more bytes into a single F82 slot than any other board. Overall, the IDEAmax/MC Landware shows top-quality design and engineering. Its software, however, pushes the product down to the bottom of the list for anyone concerned with using expanded memory.

Twelve angled sockets for SIMMs, aranged in three columns of four rows, line the top of the board. These sockets accommodate either 256K or 1MB memory modules in banks of two. You can mix banks with different-capacity SIMMs on a single card to allow many intermediate capacities between the 512K minimum and the maximum momers size of the board.



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These are just some of the rea-sons COREpower means MOREpower to PS/2. If you'd like to take advan-tage of this kind of performance, call your local CORE International dealer or contact us today. ERTIFIED BY

FOR NETWARE_2.1

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Requires: PS/2 Model 50, 60, or 80.

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In Short: A maximum-capacity—up to 12MB—memory board for the Model 50 or

60 with abysmal expanded memory perfor-

MIXING SIMMS Banks are numbered from one through six and must be filled contiguously and sequentially, starring from the fine. When mixing SIMM sizes, ments—puting SIMM sizes, ments—puting SIMM sizes, fine through four or in banks one through four for board capacities of 4½ or 64MB. All support circuitry fits into two rows of tiny surface-mount conponents at the bottom of the board. Allhough the IDEA-bottom of the board allhough the IDEA-bottom of the board. Allhough the IDEA-bottom of the board allhough the IDEA-bottom of the board all though the IDEA-bottom of the IDEA-

salled at either end of the card.

The IDEAmax/MC follows standard
PS/2 installation procedures and has its
own device identification number. However, you must run two special IDEAssociates programs to inform your system as
to how much memory you have installed.
A third program sets up drivers for EMS, a
RAMdisk, or a print spooler.

In terms of expanded memory, the IDEAmax/MC delivers the same performance as most Ps/2 memory expansion products. On our EMS test, it choked and nearly died. It took the IDEAmax/MC 184 seconds to complete our EMS test (which normally requires less than 5 sec-

onds)—probably establishing a record for laggardly EMS speed.

The IDEAmax/MC is a versatile and workable memory addon provided that you have no sajirations of using EMS. For the Model 50, with its scant expansion area, the IDEAmax/MC would seem ideal, at least if you need from 8 to 12MB of RAM. For more than 12, you! In eed two boards of any kind; so the big capacity of the IDEAmax/MC is not that important.

QUADRAM CORP. OuadMEG PS/O

Considering the complexity of some PS/2, memorry expansion boards, Quadram Corp.'s QuadMEG PS/Q look almost simple in comparison. Instead of a dense, antilike army of surface-mount components, the \$545 (with \$12K) QuadMEG PS/Q is built from three-dozen conventional DIP (dual in-line package) integrated circuits.

ed circuits.

You add memory through four sockets designed to hold SIMMs at a low-clearance 25 degrees to the board. These sockets accommodate either 256K or 1MB SIMMs, in pairs only, to allow board capacities of 512K, or 1, 2, or 4MB. The evaluation unit was equipped with two 120-nanosecond. IMB Toshiba SIMMs.

Although the QuadMEG follows the IBM configuration scheme, it misses the mark on POS by requiring some jumpers and an ominous rear-panel switch for set-up. The jumpers determine the capacity and number of SIMMs installed on the card. The toggle switch determines the operating mode of the board.

The two operating modes consist of TBM emulation mode—in which the QuadMEG assumes the identity (including device identification number) of an IBM memory board—and Quadram special mode, with its own device identification number. The essential difference is that IBM emulation mode supports only 2MB, while the Quadram mode lets you use the AMB capacity of the Quadram recommends the special mode only when 4MB is installed on the board.

TOGGLING PROBLEM The only disagreeable part of selecting modes is the toggle switch. Not only were the pencilcorrected preliminary instructions wrong about which position the switch should be in for each mode of operation, but inadvertently toggling the switch after installation will prevent the bots PS2 from booting. The symptoms of this failure are not obviu—just a preprising on-screen message. It is likely, that mistakes of this kind will start a stream of suddenly defective PS/2s marching back to dealers for unneeded repairs.

Because the switch must be thrown only during setup, in the next version it might best be relegated to jumper status—if it is to be kept at all.

If you don't want to use the full capacity of the QuadMEG as extended memory, you can install a device driver in your CONFIG.SYS file to allocate part of it to EMS. Quadram does not supply a program for making this file entry but does give instructions for adding it using the DOS COPY command.

The Quadram EMS driver allows you to set aside any amount of extended memory as EMS in 16K blocks. One option even lets you make the choice each time you boot up. While it's supposed to make the query as your machine boots in order to find out how much to give over to expanded memory, it may not accept your choice.



slowly performing EMS memory.

In Unfamiliar Surroundings...



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covering the resources of the newest technological frontier—the Micro Channel*?* Let AST* be your

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the Micro Channel.

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megabytes of flexible memory to fit your
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consideration in the con-

fining, three-slot surroundings of the Model 50.

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potential of your new computer, call AST. The number is (714) 863-9991, Or send in the coupon to AST Research, Inc., 2121 Alton Ave., Irvine,

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PS/2 MEMORY BOARDS

During testing, it would not manually assign any expanded memory.

Perhaps that's OK. You may not want to use the QuadMEG for EMS anyway because its expanded memory performance rates poorly, scoring only about 60 percent of the speed of an Intel Above Board in an 8-MHz PC AT.

Quadram also supplies you with software to help you put the QuadMEG to good use. However, the five programs of QuadMaster software cannot implement two functions-RAMdisk and print spooler. Different programs are provided for implementing these functions in different memory types. The RAM drive runs in expanded or extended memory, the spooler in conventional or expanded RAM (the latter in two versions for parallel and serial printers).

The QuadMEG PS/Q has the potential to provide you with hours of frustration. Ignore its rough edges, however, and you'll have a solidly performing RAM board for adding extended memory to your PS/2 machine.

STR SYSTEMS INC.

RapidRAM 2

STB Systems' RapidRAM 2 does more than just give your PS/2 2MB of fast memory. The \$395 (without memory chips) board will actually make your computer perform 30 to 50 percent faster.

The secret of the RapidRAM 2 is clever software combined with no-wait-state memory hardware. The software remaps the DOS memory of your PS/2 to the nowait state chips on the RapidRAM 2. As a result, overall system performance is perceptibly improved over its normal onewait-state rate. Moreover, this speed edge carries over into EMS, Version 4.0, memory; it's the only board in this current crop to offer support of that latest iteration of the EMS standard.

The RapidRAM 2 board itself belies its abilities. It looks like yesterday's technology-all conventional integrated circuits with nary a surface-mount chip in sight.

NO JUMPERS Memory is confined to two 9-chip banks of standard DIP (dual inline package) sockets, both of which must be filled with 100-nanosecond, 1-megabit Who can explain the mysteries of nature? Such as why lightning always seems to blackout the power and your PC, just as you're putting the finishing keystrokes on an 87-page report?

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STB Systems Inc 1651 Glenville Rd., #210 Richardson, TX 45081 (214) 234-8750

List Price: \$395, with OK: with 2MB, \$995. quires: PS/2 Model 50 or 60. In Short: A fast, zero-wait-state memory

board for the Models 50 and 60 that speeds up the host system by replacing slower memory while boosting its EMS, Version 4.0, and ex-

tended RAM endowment CIRCLE 601 ON READER SERVICE CARD

chips. Because the board supports only this one memory configuration, no jumpers or other hardware setup facilities are required for or provided on it. STB Systems does not include a print spooler or RAMdisk with RanidRAM 2.

Despite the presence of anachronistic chips, the RapidRAM 2 integrates well with the PS/2 hardware and software design, complete with IBM-style mounting brackets. During configuration, the board is recognized as an IBM memory expansion board and carries the device identification number of that product.

Do nothing more than an ordinary, IBM-style installation, and the Rapid-RAM 2 will work just like an ordinary. IBM-style memory expander, giving your system an extra pair of megabytes of extended memory. Only when you add STB Systems' RapidMAP software driver to your CONFIG.SYS file does the Rapid-RAM 2 come into its own.

To make the installation of this driver easier, STB Systems includes a utility that copies the driver to your boot disk and creates or updates the CONFIG.SYS file. This program allows you to slice up the RapidRAM 2 three ways, so that you can use it for conventional, extended, or expanded memory. When used for conventional memory, the native endowment of your PS/2 is ignored. You lose a megabyte that you've already paid for. In its stead,

you gain speed. The only difficulty that arose in testing the RapidRAM 2 came in trying to assign all of its memory beyond that used for remapping the DOS area as extended memory. When given the exact amount of memory it should have been able to allocate, it refused, saying its RAM supply was inadequate. By devoting a tiny fraction of its memory to EMS, the problem was eliminated. Obviously, a small counting or rounding error occurs somewhere.

The RapidRAM 2 rates as the best-performing addition you can make to your PS/2. Although the technology it embodies is beyond reproach, another model with greater RAM capacity would be even more desirable in the memory-hungry OS/2 environs.

TECMAR INC. MicroRAM

One of the pioneers in the original PC expansion board industry, Tecmar has recently suffered some trying times. The \$350 (with no memory installed) Micro-RAM shows that the company has come back with a versatile product that delivers good performance.

The MicroRAM itself features a minimum of circuitry-just over two dozen tiny surface-mount chips-and eight sockets for mounting SIMMs. The board design allows two choices for SIMMs: 256K and 1MB. Because you must install memory in banks of two and you cannot mix SIMM capacities on a single card, you can purchase one MicroRAM with either 512K or 1, 2, or 8MB. Add-in memory modules allow intermediary capacities.

The evaluation MicroRAM was loaded with a full 2Mb of 120-nanosecond, 256K Samsung SIMMs.

A long header lets you plug in a daughtercard that adds two serial ports to the MicroRAM

HARDWARE INSTALLATION To set up the hardware, you have to adjust one bank of jumpers to match the size and number of SIMMs installed on the board. These jumpers represent the biggest flaw in the design of the MicroRAM. They hide



MicroRAM Tecmar Inc. 6225 Cochran Rd. Solon, OH 44139 (800) 624-8560

(216) 349-0615 List Price: \$350 with 0K; with 512K, \$495; with IMB, \$795; with 2MB, \$995; with 8MB, \$5,295

Requires: PS/2 Model 50, 60, or 80. In Short: A good-performing memory board for the Models 50, 60, and 80 that provides up to 8MB per card, as well as two optional serial ports, and can emulate EMS. Accom-

panied by application software of dubious

CRICLE 600 ON READER SERVICE CARD

just under the edge of the first SIMM, so you'll have to set the jumpers before installing the memory module.

After hardware installation, you configure your PS/2 to accept the MicroRAM by using a copy of your Reference Diskette. The board is compatible with IBM's POS and has an IBM-assigned device identification number.

The MicroRAM has an unusual requirement that a software device driver be employed in order for any of its memory to be recognized as either extended or expanded RAM. The driver itself imposes no penalties on the performance of either memory type. Not only is extended-memory fully up to speed, but also the Micro-RAM features some of the fastest expanded-memory performance results in our tests, second only to STB Systems' Rapid-RAM 2.

Tecmar has tried to eliminate the hassles of dealing with the device driver by means of a menu-driven configuration program that allows you to allocate the Micro-RAM endowment between extended and expanded memory, as well as set up a print spooler and a RAM-based disk emulator. You can devise your own memory split in

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PC Magazine, "is an excellent solution to desktop clutter for any combination of PC, LAN-based and host-based applications."

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Unretouched screen



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■ PS/2 MEMORY BOARDS



Advantage/2 RapidRAM 2

Picking the best of these memory boards for the PS/2 is difficult because all are of high quality.

Among them, STB Systems' RapidRAM2 stands on because it on speed up even the conventional DOS memory area of a PS2 by nearly 50 percent. However, its maximum ZMB capacity is not really excupt most that OS2 is availoble, considering that its net bequest to a system amounts to only 1MB. Among the other boards, AST for its quality and zero-vair-state arbitists. Hawks only the software to multitude in the property of the contraction of the property of the contraction of the property of the contraction of the property of the proper

put it to use.

If STB and AST could get together and combine the former's software with the latter's hardware, the
result would certainly be a winning
system that would put the rest of the
industry to shame.

blocks of 64K merely by pressing the Plus or Minus keys on the numeric keypad.

Provided with the MicroRAM is Tecmar's TecDesk Software, a reworked version of what once was called the Treasure Chest. Dated is a kind word for this compendium, which was created for the entire Tecmar expansion board line. Consequently, it contains many irrelevant programs, such as one to set the clock built into PC-style examsion boards.

More worthwhile are the enhanced expanded memory RAMdisk (Tecdrive) and the print spooler (Print). Also packaged are some desktop applications that will make you better appreciate Side Kick. Metro, and similar commercial programs.

Ignore the software and concentrate on the hardware, and the MicroRAM is a worthwhile addition to your PS/2.

Winn L. Rosch is a contributing editor of PC Magazine.

After 3000 Years, Qume Soft Fonts Improve The Perfect Business Tool

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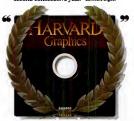
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IDEAmax/MC (left) and Subermax/MC (right), for the IBM PS/2 Models 50 and 60. Boards that readily supply a great amount of memory for today's most intensive applications, and tomorrow's most demanding tasks. Two boards, IDEAmax/MC for the

IBM PS/2 Models 50 and 60, and Supermax/EMS for the AT and XT 286, deliver a staggering 12MB and 16MB of memory, respectively. So when OS/2 debuts, you'll be prepared with ample memory to support its multitasking environment.

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(bottom), for the IBM PS/2 Model 30, PC

Supermax/EMS, a full 16MB of RAM for the AT and XT 286.

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cation, our boards can be built with either 256K chips or 1MB chips.

Supermax/MC is for the IBM PS/2 Model 50 and 60. It features 8MB of memory. one serial port and one parallel

port. IDEAmax 30 gives you 8MB of memory. While Supermax 30 combines the same memory plus two serial ports and one parallel

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	PESEN/ REAL-TOVERH DISPLATOR TO FOR TO	IME EAD AYS HE			
Take your presentation to the masses with ten new liquid crystal imaging systems, from \$895 to \$1,580.		helping p informati several years no graphics output tions. Basically, y three-beam proj encies that coul A newcomer in (LCD) technolo show real-time size. All you no PC and a standad We reviewe from Sharp EL Projection Pame from Tecks Co liveted color (o lests. Before LCD	on graphics progression of graphics progression of graphics progression of graphics provided the progression of graphics of the graphics of the graphics of graphics of the graphics of graphics of the graphics of the graphics of the graphics of the graphics of graphics of the graphics of graphics o	s to put logether representations for ly, the choice of se serious limita- way to monitors, with the monitors, littles or transpur- listes or transpur- listes or transpur- listes or transpur- listes or transpur- listes or transpur- listes or transpur- tion of the control of the control of the put of the put of the transpuries of put of the put of the the put of the put of the the the the the the the the	

Overhead Displays: Summary of Features MagnaByla rojection Panel Eiki DO-1000 Apollo PC-9888 Data Display Dalashow 1/5120-1 Sharp Electro Apollo Audio Computer Acc Eastman Kodal Telex Con nVIEW Corp sones Corp. \$1,095 \$1.199 \$1,270 Image size (inches) 85 × 5 85 × 5 8 × 5 8 × 5 8 × 6 85 × 65 8 × 5 Aspect ratio* (x:1) 1.54 1,54 154 154 1.33 1.33 154 Gray scale Color select switches Video board included 0 Software included 0 0 O Cable size (feet)/type 6/straight 6/straight 9 wye-typ 6/straight 12/dedicated 6Wye-typ Accessories included Built-in handle Buit-in handle Carrying case None

-indicates Editor's Choice
-ites O-No 133 is the aspect ratio of a conventional monitor Higher numbers indicate a vertically compressed

format, such as a printed page, 35mm slide, or overhead transparency. That was useful and often colorful, but the prospect of producing any real-time animation in the presentation was about as viable as turning the Mona Lisa into a motion picture. And once those images were committed to film, you had to make a fast reach for

In a transmission LCD system, the LCD is sandwiched between two pieces of clear plastic or glass.

the old grease pencil if you found that a spreadsheet formula had miscalculated the company's profits. So much for the clean, slick presentation you planned!

Monitors, in one form or another, can make animation a reality, but there are drawbacks there too. Conventional monitors of up to 19 inches in size, ideal for small groups, become part of the furnishings when you present your show before the control of the cont

half a dozen or more execs. Monstrous 30to 36-inch monitors work well for groups of around a dozen people, but they are expensive, weighty, and, like their smaller cousins, impractical when you have to carry your presentation through airports. Three-beam projection systems (like those large-screen TVs that entertain us at the corner bar during football season) can be seen by still larger audiences, but they are even more expensive (\$10,000 isn't unusual) and even more impractical for road shows. If you ship them around much, one or more of the color guns will invariably shift out of alignment, producing ghostly images or making your projected texts downright illegible.

THE CRISTAL OPTION We're all familiar by now with figuid cystals. They produce the images you see on the displays of everything from watches and calculators to judge computers. The same sort of technology powers the images in the LCD projection devices for overheads. But there is one fundamental difference between conventional LCDs and those utilized by noviection systems.

Most LCDs depend on reflected light for viewing. An LCD watch face, for example, has an LCD showing black characters on a familiar silver background. This

is because ambient light normally shines through the display and is reflected off of the silver substrate. When a pixel is energized, it prevents this light from being reflected back to the viewer, and hence appears black.

In a transmission LCD system, like the projection systems reviewed here, LCD is sandwhed between two pieces of clear plastic or glass. Light passes through with little interference until a jux lis energized. That pixel then prevents light from being transmitted, rather than allowing it to be reflected as it would in a standard overhead projector.

The result is that an LCD projector's screen looks like little more than a piece of glass until a PC energizes it with an image. As light passes through it, those pixels energized in the video display become opaque, and hence appear dark on the proiection screen.

With the exception of Telex Communications' MagnaByte II/52201, which has the ability to produce a variety of colors, that is true of the units that are reviewed in this article: the PC-9000 and PC-9200 from Apollo Audio Visual, the Data Display from Computer Accessories Corp., the Datashow from Eastman Kodak, the DD-1000 from Eiki International, the

ViewFrame from nVIEW Corp., the OA-

PC Viewer/Vivid LCD Vivid Systems Inc. \$1,295	Apollo PC-9266 Apollo Audio Visual \$1,335	MagnaByte II \$220-1 Telex Commu- nications Inc. \$1,580
8 × 6	8 × 5	8 × 8
1.33	1.54	1.33
Black/white	Black/white	Color
0	•	N/A
0	0	•
0	0	•
•	0	•
6/straight	9/wye-type	12/dedicated
Cloth cover	Projector	None

N:A-Not applicable: the MagnaByte II 5520-I is a color display

25 Computer Projection Panel from Sharp Trectories, the MagnaByre 1/5120-1 from Teclex, and the PC Viewer/Vivid LCD from Vivid Systems. Also available and the Davis Transiver, made in Norway and sold in the United States for \$1.350 th Health Telematics Systems of Columbus, Ohio ("On with the Show," Volume 6, Number 13).

Early LCDs capable of handling standard BM Odorformjabe. Adapter (CGA) resolution lacked the necessary amount of contrast for even reflected-light use (winess the original Data General/One, sercen). Further overleched-light use (winess the original Data General/One) panels have now given us "superwisted" cystal display panels that can provide the necessary panels that can provide the necessary systems. The Datashow system from Eastman Kodak, an imaging systems, was among the first tous the technology.

To enhance the perceived contrast, some manufacturers have incorporated colored masks within the display screen itself. When the image is shaded a pale green or amber—colors to which the human eye is particularly sensitive—wiewers are likely to see the image more clearly than they would on an unitited screen, but generally it will still appear to them as black and white.

TEMPERATURE CONTROL. Heat is a sproblem for all LOD units parked on the problem for all LOD units parked not so excreted projector. Transmission LCD is screen tend to lose contrast rapidles of the concentration of the size of the concentration of heat isn't uniform over the centre display and typically it is not occurred to the control of the contro

Makers of LCD projection systems have found a couple of ways around the malady. The most obvious is to build a small fan into the projection system, and many manufacturers have done this. The fan sucks in a colo breeze but also sucks in debris in the air, which can contaminate the screen with dust and tobacco smoke. Because of this, the display needs to be priodically disassembled and cleaned.

Another way of cooling the display involves placing an infrared filter on the bottom. Manufacturers of 35mm sider projects have used this arrangement for years to prevent the sildes from melling after a proper of the sides from melling after a consistency and the sides from the side of the sides from the sides from the side shrively just before the lens cracks. Although this device is less efficiency in doesn't help against the less efficiency in doesn't help against the jector institution of the sides of t

SIZE AND MAGE. The size of the display panel is elatively unimportant. All play panels in elatively unimportant of the units tested there were roughly the same size (about 8 by 5 inches), and if you require a larger projected image, simply more the projector further from the sent of the display, whough, is the aspect ratio—the ratio of horizontal to vertical pists, which influences whether shapes such as circles appear circular or as squashed, where the control of the control of the pists of th

Virtually all of the LCD projection systems currently available operate as the equivalent of an IBM CGA monitor, meaning 640- by 200-pixel graphics reso-

lution and 80 columns by 25 lines of text. This may no longer inspire AutoCAD users, but it's adequate for the lecture circuit. Besides, most software written for the PC will, if pressed, operate in COA mode. Indeed, most LCD systems simply plug into the output port of the computer's CGA board, with an auxiliary connector going to the conventional monitor if one is needed, floogh we expect to see EGA (Earth Lancet Graphics Adapter) resolution with-lancet Graphics Adapter) resolution with-

in a year.

Color is another matter entirely. All but one of these units are capable of displaying only black and white images—graphics or text—and how they deal with color varies at hit. Some depend on a hardware switch to change which colors are displayed as white and which as black. Others have circuitry that converts colored areas to a variety of grays-cale patterns. The safest bet is to make sure all of the images use only black and white in the first place.

No software in equired to run any of these devices. You just use the application that best fits your needs; if you'll re going to be conducting a 1-2-3 training session, then go ahead and show your audience 1-2-3. You also write a BASIC program to display a variety of images, showing the screen of your choice at the touch of a key. That would be time-consuming if you do it yourself and could be expensive if you hire a consultant to do it.

Many of the packages in our review take care of the multiple-image problem by providing utility software that allows you to enquise screen images as separate files to enquise screen images as separate files the season of the control of the contro

The usefulness of LCD projectors is not limited to classrooms and business presentations. They could be used at user groups, libraries, or just about any place where you want to address a group of people and need visual aids to add punch to your presentation. Put together a demonstration with your PC. They'll be impressed.

APOLLO AUDIO VISUAL Apollo PC-9200

Integrating an overhead projector with an LCD seems quite logical, and in Apollo Audio Visual's case, the building blocks were there. The PC-9200 began its life as the firm's AI-1000 overhead projector.

Inside the hinged display surface are a few parts that aren't normally associated with overhead projectors. For openers, there is a pair of small circuit boards holding the components that drive the LCD panel from a CGA port. Both boards assimum use of the latest surface-mounted devices (SMDs). They attach to the days panel and an internal power supply with flat ribbon cables.

To keep the boards from melting above the 360-watt bulb, a stamped-steel heat shield offers shelter from direct illumination. As simple as it may appear, the heat shield seems to do its job just fine.

A7-foot-long cable attaches to an IBMcompatible CGA board, and a second,

smaller (12-inch) section can attach to a FACT FILE Apollo PC-9200 60 Trade Zone Ct. Renkonkoma, NY 11779 (516) 467-8033 (800) 431-9029 List Price: \$1,335 Requires: CGA or EGA video board. In Short: An LCD system built into an overhead projector. Not a paragon of portability, but as a conventional overhead it's perfect for the classroom. LE 645 ON READER SERVICE CAR Apollo PC-9000 Apollo Audio Visuai 60 Trade Zone Ct. Ronkonkoma, NY 11779 (516) 467-8033 (800) 431-9029 List Price: \$1,095 Requires: CGA or EGA video board. In Short: Basically the same as the PC-9200. but without the overhead projector. Its size makes it less portable than it should be but it possesses a good scheme to handle color im-

644 ON READER SERVICE CAR

conventional monitor. The short wye section may require an additional extension cable in some circumstances. A length of about 2 feet would be better.

Controls for the Let extent of the Control for the Let extend on the Let extend of t

The background color switch made it easy to convert a color graphics image into its monochrome equivalent. You simply select which color will appear as the background (black, or white): and everything else will appear as the opposite. You can also reverse the foreground and background colors.

The image conveyed by the PC-9200 is quite readable, and the pale-green mask may account for some of that. Surprisingly, the heat from extended use didn't degrade the image quality at all. Sandwiched between the Fresnel lens and the top glass, the LCD should be an easy target for thermal overload, but the 6-inch cooling fan built into the projector seems up to the task of keeping both the display and the bulb cool enough.

constanting projector for convenience and an approximate projector for convenience and a support of the project for the project for transparencies. First, the display is not or is set to white (position to on the selector or is set to white (position to on the selector switch). Second, the installation of the LCD module into the projector reduced the display area to about it by 5 linches, considerably less than the unit's normal 10- by 10-inch area.

In spite of its portly dimensions, the PC-9200 shows some evidence of portability. The upper lens/mirror assembly folds up in clamshell fashion to protect delicate components, and the upright support member connects to the base unit with only a single thumbscrew.

PORTABLE 9000 For greater portability, Apollo also offers the PC-9000 at a list price of \$1.095. This is basically the same



The Apollo PC-9200 combines an LCD and an overhead projector. This sturdy system provides dependable performance and costs \$1,335. Apollo also manufactures the portable PC-9000 LCD sans projector (not shown).

LCD unit but without the integral overhead projector.

Inside reside—not surprisingly—the same circuit boards found in the PC-9200. Although there is a bank of nine potentiometers for adjustments such as vertical and horizontal image positioning, it is not clearly marked which does what, and the sparse documentation (two pages) will keep them a mystery for most. To its crediti, the image was perfectly centered when shipped, but a phone call will be in order if yours sets out of alterment.

The controls on the PC-9000 are the same as those of its projector-cum-LCD sibling: a top-mounted background color switch and a front-mounted contrast control. An external 12-volt power supply connects to the unit by an 8-foot cord, and a 9-foot wye-type video cable is also sup-

Apollo has elected to use not one but two small fans to dissipate the heat from the projector. No loss of image contrast was noted after an hour on top of a 360watt projector.

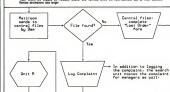
SYFI OW

Image quality is just as good as that of n on-screen flowchart processor that knows about flowcharts - not just another "screen draw" program that makes you do most of the work. EASYFLOW is a powerful full-screen graphics program dedicated to flowcharts and organization charts. With it you can quickly compose charts. More

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- ► User triendly: Don't take our word for it. PC Magazine* says "EasyFlow lives up to its name. It's hard to imagine any easier and more flexible way to produce
- basic and even complex flowcharts' Mouse: Optional but fully supported.
- It prints: On most popular matrix printers including IBM, Epson, Toshiba, HP LaserJet, LaserJet-Plus and many others.
- It plots: On HP7440, 7475, 7550, 7570, 7585B and compatible plotters It works: We are contractually prevented from mentioning the name of the "big
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- DOS 2.0 or higher and an IBM CGA/EGA/VGA or Hercules monochrome compatible adapter card Order direct for only \$149.95 + \$2.00 S&H (USA/Canada), \$10.00 (foreign). Payment

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Order Desk: 1-800-267-0668 HavenTree Software Limited PO Box 1093-P Information: (613) 544-6035 ext 49 Thousand Island Park, NY 13692 Telefax(G3): (613) 544-9632

the PC-9200; the image is just as sharp and contrast is acceptably high (due in part to the light-green mask), especially when displayed on a convex projector screen.

NO SOFTWARE Portability could be a problem here. At 23/4 inches thick, the PC-9000 would be a tight fit in all but the largest briefcase

Software is supplied with neither unit. Depending on your need, this may not be a problem. Both Apollo displays are perfect-

ly suited for active demonstrations, such as showing a classroomful of people how to set up a spreadsheet. And the fine performance of both Apollo designs makes them perfect tools for classroom instruction. To use one as a substitute for a slide projector. though, you will either have to purchase a presentation graphics program or write your own in your favorite programming language.

COMPUTER ACCESSORIES CORP. Data Display

Heat, the major enemy of LCD projection systems, must have been weighing heavily on someone's mind at Computer Accessories Corp. This company has gone after the problem with both barrels fully loaded. Some manufacturers use fans; others try infrared filters. The Data Display uses both. The result is a system that should function admirably on top of the biggest overhead projectors available. It lists for \$1.199

The fan draws cooling air from a row of slots along the lower right edge of the case. and exhausts it at the top left corner. In spite of its diminutive size, the fan appears to pump a fair-sized cooling breeze through the unit. With the air, the fan draws such things as dust and smoke, which can easily degrade the image quality of the LCD projector. The bottom IR-absorbing glass is held in place by four stamped-steel latches; once it is removed, the IR filter and the bottom of the display can be easily cleaned.

NICE DESIGN The Data Display's design is one of the best among the products tested. Only 11/8 inches thick, it fits in most briefcases; more important, all of the con-

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The slim Computer Accessories' Data Display presents sharp overhead images with the help of its accompanying Presentation Partner software. The package is priced at \$1,199.

trols are top-mounted for easy accessibility by the user.

The external video controls include a contrast slider plus switches for power, reverse video, and synchronized fine-tuning. A flip-up door lets you access tiny knobs to adjust horizontal and video image position or color "deselection" (their word, not mine).

Two cables are provided for attaching the unit to your display adapter: the usual nine-pin RGB cable and a composite cable with RCA pin-plug connectors. This dualcable arrangement will come in handy if vou're fortunate enough to have a CGA board with both types of output, as no other accommodations are made for running the Data Display with a conventional monitor. The composite video input does allow use on computers such as the Apple II. which has no RGB connector. There is also an external 9-volt AC adapter with an 8-foot cable.

FOUR PROGRAMS Computer Accessories made sure that software was a part of the Data Display's repertoire by including a copy of Brightbill-Roberts' Presentation Partner. On the disk are four programs: CAPTURE, which saves video images on a floppy disk; a menu editor called MED, which assembles those images into a presentation; MEDSHOW, for playing them back; and a non-copy-protected run-time module called MENUSHOW, for displaying your presentations.

All the programs worked as advertised, and we had no problem with memory-resident software, such as Borland's SideKick The default interrupt for CAPTURE is activated by hitting Ctrl-Alt-Minus sign. Should you discover an incompatibility, simply type CAPTURE /k at the DOS prompt, and the program prompts you to specify the three-key sequence you want to use for storing images.

Presentation Partner, however, is copy protected, which could cause portability problems. The knockabout life of an LCD and that of a copy-protected floppy disk tend to be mutually exclusive. Not a great combination, to say the least

The visual presentation of the Data Display leaves nothing to be desired. It's sharp-legible in all but the brightest rooms-and the aspect ratio is the same as that of a standard monitor (so circles stay round instead of regressing to ellipses). The color deselection control, which changes various combinations of CGA colors to black-and-white images, will suffice in most situations. Computer Accessories distributes the

Data Display through PC retail outlets. The same unit is marketed through audiovisual dealers by Dukane Corp. of St. Charles, Illinois, under the name of MagnaView (the only difference is its color-gray instead of the Data Display's vanilla)

Despite its copy-protected software, this display is one of the better choices for combined portability and usefulness in the LCD projector market.

EASTMAN KODAK COMPANY Datashow

Considering that the Kodak name is synonymous with visual images, it's no big surprise that the company would also direct its considerable talents and resources to the LCD projector market. The Datashow is the fruit of these labors. It was one of the first units on the market, and it has emerged as the standard by which others are often compared. It lists for \$1,270 and is clearly the most presentation-oriented unit in the group we reviewed. Although it can be used for presentations with just about any PC software, its ability to step through a series of screen images with a wireless remote control makes it an able substitute for 35mm slide presentations.

The Datashow's projector screen housing has no contrast and color handling controls. Its only external features are a small detector for its infrared wireless remote



Computer Accessories Corp. 6610 Nancy Ridge Dr San Diego, CA 92121 (800) 582-2580 (800) 582-0852 (inside Calif.) List Price: \$1,199 Requires: CGA or EGA video board.

In Short: An excellent LCD projector with both a fan and an IR filter to keep heat at bay. Presentation Partner software gives it slideprojector-like capabilities. The software is opy protected. 642 ON READER SERVICE CARE



Kodak's Datashow LCD system includes a convenient infrared wireless remote coutrol. The Datashow does not display certain colors, so your presentations may used some editing.

and a 6-fox-long cable that's equipped with a host of connectors. The nine-pin RGB connector is there, along with a 9-mic-long cable that attaches to a conventional CGA monitor. A DIN connector attaches to the external power supply, and a 25-pin D connector attaches to one of the CS sentil ports. If you have an AT competers to the connection of the con

FACT FILE

Datashow
Eastman Kodal, Company
Motore Picture and Audorossall Products

Division
343 State St.
Rochester, NY 14650
(800) 445-6325 (ext. 877)
List Prices 1,524 or EGA video board.
In Short: Includes a wireless remote control but takes a Band-Aid approach to heat problems, and cannot deal whit mages of certain

colors. Software not copy protected

in this case, comes from the batterypowered remote control, which can step through a series of graphics images made with the Showmaker software that comes with the unit.

ON WITH THE SHOW Showmaker, from Sayette Technology, a subsidiary of Eastman Kodak, offers programs for capturing screen images, editing the presention, and playing back an entire multi-screen presentation. The software and the remote give you the PC equivalent of a 33mm slide projector. The remote control sends signals to the LCD, which then communicates with the PC through the serial

port. The screen capture program is memory resident, and is activated by pressing the Cirl-Alt-Minus key combination. The image on the screen at the time will be saved in the same filename with an extension of .GNI. Take care I you install the capture routine along with other memory-resident programs, no provisions have been made to alter the Cirl-Alt-Minus key combination of the company of their content they privally according to their content they of their content they of their content they of their content they privally according to the content they privally according to their content they privally according to the content they privally according to the content they privally according to their content they privally according to the content they are content they according to the content they are content th

The editor is used to assemble the individual screen images into a logical presentation, which is then viewed with the playback program. The show can be controlled using the infrared wireless remote control or, if you prefer, the PC's keyboard.

The remote also controls such aspects as image inversion and centering, screen blanking, and contrast and synchronization adjustment. It only works, however, when you are in front of the display unit. A more ornnidirectional pickup for the IR signal would be appreciated, but even with its limitations the remote is a distinct advantage.

SOME LIMITATIONS Where just about every other projector makes some attempt to handle screens of various colors, Kodak forces you to change them to meet the limitations of the Datashow.

The colors green, cyan, brown, and white all appear as white on the screen, while black, blue, red, and magenta are all rendered as black. This arrangement is fine if you have the freedom to change the color

■ The Datashow's only external features are a small detector for its infrared wireless remote and a 6-foot-long cable that's equipped with a host of connectors.

of the screen that you intend to capture, but some software packages simply don't allow for contingencies such as that.

Kodak's solution to the heat problem is obtained and approach at best. Kodak provides a cooling fain, which attaches to the rear of the housing as an accessory. C'mon, Kodak—for this price, it should be standard and integral. Despite its limitations, the Datashow, by virtue of the wire-less remote, is still one of your best bets for slide-type presentations.

EIKHINTERNATIONAL INC.

Eiki DD-1000

lists for \$895.

The Eiki DD-1000 isn't exactly Sasquatch, but its footprint is big atop an overhead projector.

head projector.

Eiki International plans to release an IBM-compatible EGA display, which will list for \$1,495. The DD-1000 we reviewed.

The stylish gray housing of the DD-1000 requires more surface area than all but one of the displays in this review. At 13 by 14½ inches, it also requires a fairly large projector if it's to work without interference from the overhead mirror arm. And it is 2 inches thick, so transport will require a fairly hefty brifects.

Perhaps because of this bulk, the DD-1000 has a built-in handle that folds out from the base of the unit. Apparently the handle was put there to aid portability, but I can't see carrying around a 6-pound box when both too and bottom panels are glass.

Some of these robust dimensions can be attributed to the hefty tangential fan assembly. With its high capacity land surprisingly low noise), it should guarantee comfortable operation on the largest overhead projectors. Cooling air is drawn in through slots on the front bottom edge and is ex-

■ The Eiki displays an image of higher contrast than many of the units in this review, even though it lacks the common green background mask.

pelled at the top-rear edge. The tangential design ensures an even flow of cool air along the surface of the LCD, something that may not always occur with conventional turbine-style fans.

EASY CLEANING The big fan will likely suck in quite a bit of dirt, but both top and bottom glass panels can be removed



The Eiki DD-1000 is the second-largest LCD unit reviewed, measuring 13 by 14½ inches. Much of the space is taken up by a powerful cooling fun.

for periodic cleaning. Scratches should also be no problem, because both pieces of glass are tempered.

On the side of the case, you'll find a inneine pin RGB input, a power cable connector, and controls for contrast, normaline. Attaching to the connectors are an external 9-volt power supply and a straight folion RGB cable. The cable word allow a conventional monitor to be attached when the DD-1000 is in use.

the DD-1000 is inuse.

Color selection is a weak point of the Eliki display. The bank of three DIP Eliki display. The bank of three DIP workless is a hard oxersed position require the use of a sharp object, such as a persel tip. Each switch controls the signal intes (red, green, and blue), toggling each from around to inverse video. There is no such thing as a default setting. It will take a control of the strength of the dip of the dip of the strength of the green and blue, toggling each recurrent degrees of fading with the switches control of the dip of

A small compartment on the bottom of the display gives access to an array of seven potentiometers for fine-tuning horizontal and vertical position, frequency, and phasing control.

pnasing control.

One minor problem is that the display unit must be placed upside down on the overhead projector for the adjustment process. The manual cautions that the cooling system operates less effectively in this position, so if you're making adjustments while the overhead projector's light is on, be prepared to act quickly.









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NO SOFTWARE The Eiki displays an image of higher contrast than many of the units in this review, even though it lacks the common green background mask.

The software supplied with the Eiki display can be described in a single word: absent. You can use the unit as an educational tool for most CGA-compatible applications, but if you intend to use it for graphic presentations, you will have to buy a separate program or scour bulletin boards for similar utilities.

nVIEW CORP. ViewFrame

If we gave a prize for thoughtfulness, nVIEW Corp, would have no competitors. Other displays don't measure up to nVIEW's ViewFrame when it comes to software and accessories, and nVIEW offers the whole package for \$995.

It's a moot point whether this display fits into a briefcase, because the View-Frame comes with its own attaché case at no extra cost. The handsome padded-vinyl carrying case protects the display system and adds to its portability, an advantage that LCD projectors have over conventional display systems. At only 1½ inches thick, the slim display unit leaves plenty of room in the 3-inch thick attaché for software and notes.

The software supplied with the View-Frame includes a complete copy of Brightbill-Roberts' Show Partner. Although the software included with other packages (when any is supplied at all) can capture





The \$995 ViewFrame by nVIEW comes bundled with one of the most popular presentation design programs: Show Partner, Construction of the unit is extremely rugged.

screen images and assemble them into a presentation, Show Partner has one important addition—the GraFIX Editor.

Color images, a headache for most LCO systems, can be patched up easily with GraFIX to provide a legible display no matter what colors were displayed in the original image. A single key, for example, will change the background color to anything you want (preferably black or white.) Similarly, any color portion of the

Grafix also lets you add titles to the images you have selected when the software application doesn't allow for this. Say you have a 1-2-3 spreadshet screen and we not add a description to a cell formula. Of course, you could go back to 1-2-3 and add a label. With Graff IX, you can simply type a label onto the captured image in any of 20 type fortis.

image can be changed to another color.

Lines, shapes, and the like can also be added with GraFIX, from the keyboard and also from a Microsoft Mouse. The and result is something like overlaying a free-hand graphic image (like PC Paintbrush output) on any other image.

ABUNDANT SOFTWARE Show Partner isn't the only software included with the ViewFrame. A floppy disk with several utilities, unique to the needs of the dis-

play, is also part of the package. It contains thoughtful little programs like one that displays a test pattern for focusing, and another that switches an EGA board into CGA emulation mode. Still another, VFCO-LOR, is a memory-resident program that changes multicolored text into an image

 In terms of quality, the ViewFrame is built as if nVIEW were aiming at a military specification.

the ViewFrame can deal with. It's not as good as the GraFIX Editor (it causes a lot of snow on the conventional monitor) but it will do in a pinch.

If GraFiX and VFCOLOR aren't enough to handle your color woes, there is yet another option. On the control panel is a "palette" switch that changes some of the colors into a single gray shade. Since all LCD systems are inherently low-contrast to begin with, this choice is really best in a totally darkened room.

In terms of construction quality,

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nVIEW built this unit as if the company were aiming at a military specification. The heavy-gauge steel enclosure might add a lot to its weight, but (except for the glass panels) it also makes the unit practically indestructible. The controls are robust slide switches, not delicate DIP switches and the contrast control feels as sturdy as the volume control on your home stereo

The ViewFrame attaches to the PC with a 10-foot cable, and a separate 2-foot wve cable can also be used to attach a conventional CGA monitor.

nVIEW's approach to eliminating proiector heat has a problem of its own. There is an internal fan, but the ViewFrame also incorporates a patent-pending infrared filter for the bottom glass panel. The problem is that, while rejecting IR, it also reflects a good deal of the visible light that should go through unobstructed. As a result, the image is not as bright as with other units tested. One way to resolve this is to use the ViewFrame with a brighter projector.

The ViewFrame is tough and versatile. and it comes with the best software of any of the units we tested. Where other manufacturers have a hard time dealing with heat, it seems ironic that the ViewFrame begs for the brightest overhead projector you can find.

SHARP ELECTRONICS CORP.

Sharp QA-25 Computer Projection Panel

The QA-25 Computer Projection Panel is Sharp's entry into the LCD projector field. Not surprisingly, it's one of the most reasonably priced units we reviewed. It lists for \$895. The enclosure's bulk is comparable only to the Eiki DD-1000 and Telex's MagnaByte 1/5120-I; no software is supplied by the manufacturer. An optional \$79 slide show program is available.

With exterior dimensions of 15 by 13 by 21/4 inches, the OA-25 requires a pretty verse video, and the contrast control. large briefcase if you plan to haul it around with you. There is a fold-out carrying handle on the bottom of the unit, but frankly, I can't see toting around anything with glass panels without a protective case.

The cooling fan on the QA-25 should keep the display image from coming unglued on even the largest overhead projec-



Sharp's OA-25 Computer Projection Panel generates clear images that seem brighter than most. A drawback is the inconvenient positioning of image adjustment controls.

tors. Cool air enters slots along the front lower edge and exits at the upper rear. The glass panels can be removed to clean out the dust and smoke that will eventually accumulate within the display housing.

A straight, 6-foot RGB cable connects the display to the PC, and the external 9volt power supply is connected with a cord of similar length. But no provision is made for attaching the display to a monitor.

DIFFICULT ADJUSTMENTS Only three controls are mounted on the side of the display: a power switch, a switch that toggles the image between normal and in-

A product data sheet sent with the QA-25, which describes other adjustments to the display as "easy to perform," is about as helpful as a how-to instruction sheet for amateur brain surgery. To get to other switches, you have to turn the display over (which, of course, reverses the image) and move a small access panel. Beneath the panel you find seven rotary switches for adjusting the horizontal and vertical image position, frequency, and phasing, Buried deeper still are three tiny DIP switches for selecting which of the red, green, and blue



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OVERHEAD DISPLAYS

signal lines will be displayed as white and which as black. You will need a pointy object (like a ballpoint pen) to change these switches if the factory's default setting (white, cyan, brown, and green displayed as black, and the other colors as white) doesn't work with our softwith our

The operator's manual, however, was the best of those we reviewed, written so that the uninitiated would have no problems understanding it.

If you can tolerate the color image controls and bulky design, you'll find the image quality of the QA-25 to be quite good. No background color mask is built into the display, and it really didn't seem to be needed. As a result, the image appeared a bit brighter than most.

Sharp offers a number of accessories to increase the QA-25's versatility. They include interfaces for use on Apple II computers and both hard and soft carrying cases, which I highly recommend.

MagnaByte I/5120-I MagnaByte II/5220-I

Where most companies offer only one LCD system in their arsenal, Telex Communications offers two: the MagnaByte 1/5120-1, which lists for \$1,292, and the MagnaByte 11/5220-1, which lists for \$1,580. The second is the only color unit

available today

The units share some hardware—a video bosard and a cord-type remote control. The video board supplied with each Telex. LCD system performs three functions: emulating IBM's Color/Graphics Adapter, supplying input to the remote control used by both MagnaByte units, and using the PC's power supply to power the display. As the board uses only 3½ watts, even the most overburdened power supply should

not be affected at all.

Construction quality is comparable to

that of other CGA boards. The component count is relatively low. On the back strap are a 25-pin D connector for the video cable and an RJ14-type socket for the remote control.

control.

A bank of eight DIP switches on the board determines whether or not the remote control point is activated, how color images are handled (strictly black-and-witter or some as shades of gray), and whether the board emulates a color gray) and whether the board emulates a color gray) and adapter. Monochrome adapter emulation doesn't change the video resolution from the CGA mode's 640 by 200 pixels, and it doesn't support Hercules graphites mode.

MINOR PROBLEMS We found a couple of minor problems when we installed the board in a PC's Limited AT. For openers, unless the board is operated in MDA emulation, no provision is made for attaching a conventional CGA monitor for

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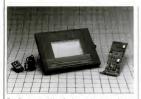
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■ OVERHEAD DISPLAYS



Telex Communications' MagnaByte I system is less expensive than its similarly named sibling, but it's not nearly as connelete. Its colorhandling limitations can hinder image quality.



The MannaByte II, on the other hand, is the one LCD system we reviewed that projected color successfully. Used in concert with a good graphics package, it is a true winner

graphics displays. With CGA emulation you can get graphics displays, but you'll have to install an additional video board (MDA or Hercules) to produce text images on a monochrome monitor.

The port for the remote control appears to the PC as a game port, so if a game port is already connected, it will have to be removed-only one is allowed in the computer at a time. If a game port wasn't previously installed in the PC, you will have to

 In just about every respect, the two Magna-Byte models could not be more different.

fumble through the manual to find the DIP switch to activate it on the motherboard, or run the diagnostics program to select it on an AT.

The remote control attaches to the video board via a 12-foot cable. (An 18-foot extension cable is available.) On the remote are a contrast control and switches that you use to select normal or inverse mode, temporarily blank the screen, and step back and forth through a script file of screen images just as you would with a slide projec-

tor. The software necessary for capturing screens and writing the script file wasn't ready when we reviewed these displays. In its place, a postcard was packed with each unit promising that owners would be sent the software as soon as it became available. It should be ready by the time you read this.

From these common beginnings, the Telex LCD systems go their separate ways. In just about every respect, from construction to performance, they could not be more different.

THE MAGNABYTE The MagnaByte I (also referred to as model number 5120-1 in the product literature) is the unit that competes head-to-head with most of the other display systems available. In most respects, it comes up about average.

With exterior dimensions of 151/4 by 12 by 2 inches, the MagnaByte I won't win any portability contests, but its rugged construction suits the knockabout lifestyle of a traveling road show. The case is made of heavy-gauge steel, and the top and bottom panels are made of impact-resistant Lexan rather than the usual glass. The plastic panels may become scratched, but it's unlikely that they'll ever break.

This same bulk also makes the Magna-Byte I difficult to position on top of smaller overhead projectors. The edge of the case may interfere with the upright arm holding the mirror and the lens assembly. Larger

projectors should work just fine, and the dual-cooling-fan system should keep the display functioning well regardless of the projector's wattage.

To let you remove the dust and lint that accumulate in fan-cooled LCD systems,



MagnaByte I/5120-1

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Requires: CGA or EGA video board. In Short: Cord-type remote control makes the unit suitable to replace a 35mm slide pro jection presentation, but the limited colorimage-handling capabilities require careful selection of software

CIRCLE 637 ON READER MagnaByte II/5220-I Telex Communication In-9600 Alrich Ave. South Minncapolis, MN 55420

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■ OVERHEAD DISPLAYS

EDITOR'S CHOICE

Data Display MagnaByte II/5220-I ViewFrame

Operational differences distinguish

our choice of LCD systems.
Computer Accessories' Data
Display, priced at \$1,199, proved
noteworthy by virtue of its versatile
and accessible controls. It also handled color images better than most

of its competitors. nVIEW's ViewFrame, from its full-featured presentation software to its high-quality carrying case, represents the most complete package of the lot. It lists at \$995.

But when it comes to legibility and visual impact, nothing measures up to the Telex MagnaBus (I. 8 the only display) that delivers your message in color. And even if its colors are not what you expect, they show up with unsurpassed clairity. It is suithly that a presentation on this system would go unmoticed. But that's also true of its price: at \$1,580, it was the most expensive unit we reviewed.

Telex has mounted both Lexan panels to the unit with spring-loaded latches.

The MagnaByte I's color-image-handling abilities are a mixed blessing. With the display adapter's switches set for a mono image, white is displayed as white and everything else shows up as black. In color mode, some colors are white, some black, and others a shade of gray. The relatively low contrast on LCD systems makes gray shades more of a novelty than a practical solution. Software that can circumvent the color-

handling limitations demonstrates the MagnaByte I's strong image contrast. Its green background mask may belo

green background mask may help.

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might expect, but the MagnaByte II's image is a world apart from the usual lightgray-on-dark-blue.

By using birefringent liquid crystal technology (where certain wavelengths of light are transmited while others are reflected), the MagnaByte II yields an image which, though unfaithful to the image on a conventional monitor, is striking in its beauty and legibility.

In noninverted mode, white, gray, yellow, and brown appear as bright yellow; magenta and red appear gold; green and cyan show up as deep orange; blue becomes purple; and black and dark gray are rendered as dark blue. When inverted, white, gray, yellow, and brown appear as dark blue; magenta and red appear purple; green and cyan show up as orange; blue becomes gold; black and dark gray become yellow.

Having once seen a portable LCD color to expect the television set, I really ddn't expect the MagnaByte II to deliver a legible image. As it turned out, the display was by far the most legible of the units tested, particular-most legible of the units tested, particular-ages. White characters from something as a white characters from something as as wird yellow against a navy blue background.

The MagnaByte II's ability to deal with a color screen image, though it was not adjustable, proved adequate for most situations. With display quality this good, a presentation made with a good graphics package would not soon be forgotten.

Physically, the Magnalbyte II is unremarkable, and that's good. The unit's prolate in an executive's brife-case. If dirt sucked in by the cooling fan becomes a prolate, and you want to clean the unit, you can easily remove both the glass punch the sturdy metal enclosure using nothing more attained to the property of the prop

rious limit on portability-the video adapt-

er. It's one more item that you need to treat

with care during transit. Apart from this

aspect and the fact that the DIP switches

require you to poke around inside your

computer, the MagnaByte I works well

PC MAGAZINE

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If portability is your primary concern in an LCD system, look no further than Vivid Systems' PC Viewer/Vivid LCD. At only 113/4 by 11 by 3/8 inches, it fits in even the tiniest of briefcases with room to spare. and it lists for \$1,295.

On the front of the display are three connectors: one for the external 5-volt power supply, one for a conventional RGB cable that attaches to any CGA or EGA video board, and one for a composite video signal. If you have a CGA board that has both composite and RGB connections. you're lucky-no provision is made for a conventional monitor if the PC Viewer takes up your only connector. The composite port also makes it possible to attach the PC Viewer to computers like the Apple II. A short wve cable is supplied for the composite input, but none is furnished for an RGB monitor.

On the top of the display are three controls, only two of which are self-explanatory. One is the usual contrast control. The second is a three-position slide switch labeled video. In the + position, a normal image is displayed; in the - position, the inverse color image is shown; and in the 0 position, the screen goes blank.

The third switch is a self-centering momentary slide switch labeled mode, which serves to adjust the centering of the image and signal synchronization. All you have to do is push the switch either way and it steps through a number of image positions



PC Viewer/Vivid LCD 41752 Christy St Fremont, CA 94538 (800) 331-2834 (415) 656-9965 List Price: \$1,295

Requires: CGA or EGA video board. In Short: The darling of the travel set, with the smallest dimensions of any in our review. Possesses no cooling fan and display quality will likely suffer. Includes no software and cannot handle multicolored images well.



Vivid Systems' PC Viewer is the most portable of LCD units, the lack of a cooling fan means that images may become degraded and the system may then have to be cooled down.

and sync signal possibilities. The system worked just fine, however, when it was connected to the Jade CGA board in my PC's Limited AT, and the mode switch was not needed.

Color image handling is not the forte of the PC Viewer. Black and dark gray are rendered as black, while everything else shows up as white. There are no choices here, so your software had better be able to live with this limitation.

When used with an application that can display an image the PC Viewer can live with, though, it produces a surprisingly legible image. Contrast is quite high, and a pale-green background mask adds to the clarity

How long the image will remain readable, depends on the wattage of the overhead projector and how long the unit is operated. In their quest for the smallest case available, Vivid Systems did not install a cooling fan in the display. The manual states that if the image becomes degraded during operation, the unit (or more properly, the projector) should be turned off until it cooks down. Another warning in the Macazine.

manual cautions against placing the PC Viewer on an overhead projector known to melt conventional transparencies. Frankly, I've never heard of such a thing happening with any overhead.

Vivid Systems has thoughtfully included a couple of soft flannel cases-one to

■ The PC Viewer's image contrast is quite high, and a pale-green background mask adds to the clarity.

protect the display unit, and another for the power supply and cables. The result is the only LCD projector that can happily coexist with a pastrami on rye in an executive's overstuffed, undersized briefcase.

Frank Bican is a contributing editor of PC

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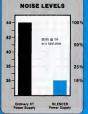


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And, unlike some, it permits imultaneous display of real-time images on the PC monitor and projection screen. This Kodak system also lets you manage presentations with exclusive, multi-use software, wireless remote control, and, new from Kodak, additional software for remote control of application programs like Lotus 1-2-3.

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HAVING IT ALL: Integrated Word Processing Packages

ike Rodney Dangerfield, integrated word-processing programs don't get much respect. Or attention. We've all heard, maybe even participated in those passionate arguments about the ments of the big-name standalone programs: Louis 1-2-3 vs. Excel in the spreadsheet wars, WordLerfect vs. XyWite in word processors, dBASE vs. R:base in databases.

But when was the last time you heard people arguing heatedly about the respective merits of, say, the word processing modules of Enable and The Smart Software System? Or Ability Plus vs. PFS:First Choice? Integrated packages don't stir us much, probably in large part because those impassioned debates about the merits of software are usually between so-called power users, who typically disdain multifunction programs, going instead for the gold of powerful, versatile standalone packages.

As we saw in our report on those standalone WP programs in the February 29 issue, the range of features, ease of use, and price among the 55 packages we reviewed varies greatly. It's hard to imagine someone whose word processing needs couldn't be met by one or several of those programs.

But at least potentially, the integrated



Integrated word processing programs can provide a lot of features while saving you time and money. Check out what these 18 packages have to offer in the second installment of our word processing roundup.

■ INTEGRATED WORD PROCESSORS

packages offer even greater value. And we're not talking only about price.

PROMISES OF INTEGRATION The word processing modules within integrated, multifunction packages typically make five promises: (1) adequate WP functionality, reasonably close to that of the best standalone programs; (2) easy exchange of data with other modules in the package; (3) easy merging of the work of two or more modules onto the printed page; (4) economy at purchase time, by getting several functions for about the same as or little more than the cost of a topof-the-line single-function program; and (5) economy in use, with much shorter learning cycles, thanks to consistent, shared command structures throughout the various parts of the package.

The extent to which integrated software delivers on those promises determines its success in the market—and also, to a large degree, your satisfaction once you've bought and loaded it on your PC.

bought and loaded it on your PC.

Now, new vigor at the bottom of the integrated software market and new moves in the high-end, high-functionality products—especially in local-area network versions—are bringing the spotlight back to integrated packages once again.

A BRAYE NEW WORLD. When Louse first showed prerelease versions of Symphony at the ill-dated Softcon track show in New Orleans in February, 1984, just a very large 12-4 had exploded into the PC software market's biggest seller ever, there were high phens. Showageers were date lake the computer traction was a seller with the computer traction of the seller with the computer traction of the seller was the computer traction of the seller was the computer traction of the seller was the seller with the computer traction of the seller was the sell

It hasn't exactly turned out that way.

Though Symphory was the first widely available top-of-the-line integrated soft-ware for the IBM PC to include word processing, the program never became known for its WP prowess. Less an extension of 1-2-3 than an unfortunate stretching of the spreadsheet metaphor until it snapped, Symphony's word processing earned a reputation for clumstriess.

Lotus, still remarkably touchy about the ho-hum reaction when Symphony was actually delivered later that year, likes to point out that if Symphony were a software publisher's only product, that company would rank among the top ten firms in the business. So what? The largest part of Symphony's installed buse consists of people who bought the program because for the first 2 years of its life, it had a bigger, better spreadsheet than I-2-3.

Few buy, or use, Symphony for its dazzlingly mediocre word processing func-

If Symphony were a software publisher's only product, that company would rank among the top ten software firms. So what?

tions. The new Lotus Add-In word processors for 1-2-3 demonstrate just how feeble is Symphony's word processing: 4Word, InWord, and Write-In are all better word processing tools than Symphony's WP module.

ROOM AT THE TOP Framework followed Symphony to market, competing for leadership in the new high-end integrated market. But Framework, though built around what was clearly a better idea—the "frames" metaphor of the program is an extremely powerful concept—was flawed by slow operation, limited functionality, and a graftled-on communications module.

and a gratted-on communications module. Its successor, Framework II, is a much better product in every way—the version, many of its fars believe, that Ashton-Tate would have waited to release if Lotus and Symphony had not been breathing down its neck. But Framework II also has not caught on in the mainstream business word-processing - plus - something - else market.

Other vendors have done better.

The Software Group's Enable and Innovative Software's Smart Software System packages have earned respectable
market shares and loval users in businesses

of many sizes. The two, in fact, may be the best-kept secrets in the PC software industry. Both, for example, offer sophisticated local-area network versions for those who see the office-automation functions of an integrated package as a natural for LANS. The Smart Software System shoa ta UNIX and Xenix versions for those who believe that multiluser answers ought to be deliv-

ered on terminals.

And unlike the less-than-robust functionality of the better-known integrated WP programs, the Smart series, particularly, challenges the leading single-function standalone programs on their own turf while delivering on those five promises of integrated software.

VIGORAT THE BOTTOM Early in the history of the integrated-software business, several vendors tested the waters with low-end, low-cost, modes-functionality integrated packages, of which Alpha Software's Electric Desk was probably the best and most successful. None of these packages did well, and most soon disappackages did well.

In 1986, though, Software Publishing tried that market once again, with PFS:First Choice, which has gone on to become a smash hit.

Whether First Choice was the product that finally offered the right mix of features and power, or whether it was the market, not the software, that changed so fundamentally over that time, the success of First Choice showed that there were a lot of people looking for affordable, easy-tolearn-and-use multifunction programs.

The recent release of Version 2.0 of PFS:First Choice extends the product in several ways and offers First Choice users an obvious upgrade path.

But most of the recent news at the inexpensive and easy-to-use end of the integrated market has come from the release of Microsoft Works for the PC.

TRUE BLUE Works comes from the Macintosh environment, and at first, with its drop-down menus, seems a slightly skewed version of the Mac's pull-down world. In fact, Microsoft Works could hardly be more True Blue. It is the first commercial program shipped with the new interface IBM says it will support across its

EDITOR'S

• Enable

Microsoft Works
 PFS: First Choice

Smart Word Processor

Integrated packages usually take a backseat to standalone packages, but some integrated packages could qualify as the best-kept secrets of the computer industry.

For example, it's hardly common knowledge that Ability Plus (\$259) offers one of the best examples of tigla integration you'll find it any package, allowing you to move a live version of a spreadsheet into a report, change the spreadsheet data, and see those changes reflected in the report. Or that

Better Working Eight-in-One has a deabase, spreadheet, author, graphics, communications, and desktop trillities, communications, and desktop trillities as well as an entry-level word processor with some handy advanced features—all at an almost greenway price of 559.95. Or that WordPerfect Executive, a scaled-show integrated version of the best-seller WoodPerfect that is designed for laptop users, user text files that are compatible with

senior program.
At the high end, nov integrated parkages stand out from the 18 has we reviewed. Enable, from the Software Group, may make you climb to steep learning earry. In that is because the combination word processor's prevalued to the standard of the standard of

megratea.
As a word processor, Enable could easily stand by itself, offering such features as expert commands, a table-of-contents function, mail-merge, a spelling checker based on an 80,000-word followers, and a wontriens.

lator, among others. And with a LAN version. Enable becomes an attractive package for users who believe that the office automation functions of integrated packages are especially suited for

LAMs.

Like Enable, the Smart Word Processor, part of the Smart Software System, has a LAN version (which was an
Editor's Choice among integrated programs for LANs: see "Making Contetions: Integrated Multifunction Programs for LANs;" in the November 241987, Essee). both peackage also UNIX and Xenix versions for users who
fewer those multiplicating environ-

Priced at 8895 for the complete prackage. Smart ruish the best stand-adoue word processors and adds value by providing a spreadsheet with graphics and a database as well as commanications, time and appointment management, and calculator capabilities. The program audies extensive sites of windows, has two operating modes (text entry and command) and an external DOS access mode, and features free different confidence levels and two

kinds of help.

Then, too, there's Stuart's spellchecking and footnoting capabilities, not to mention its learn mode for creating nucros and its programming language for more sophisticated applications—all features that make the Smart Word Processor appropriate for all levels of users.

At the low end, you won't find a more feature-laden integrated word processor than Software Publishing Corp.'s PFS-Frss Choice. Easy to use and priced at only \$149. PFS-Frss Choice has spreadsheet, file management, gug blev, and communications. capabilities in addition to a relatively fast word processor.

Suitable as a personal ward procesor, First Choice makes some trade-offsfor case of use, but it also has some of the powerful features; our wouldn't want to be without, such as a spelling checker based on a 75,000-word dictionary that flush misspelled, unknown, and double wards, as well as a 20,000-word thesaurus.

Context-sensitive help and five pulldown menus contribute to the package's simplicity, and speed keys for bypassing menu options are helpful when simplicity starts to become cumbersome

First Choice does have one limitation, however: it can hundle documents only as large as 64K. To create a longer document, you can use the join command to combine two smaller documents into ane.

and a court to use. Microsoft Workscome to the BMP (From the Macrosoft to BMP (From the Maworld, and its pail-down means are evslence of this heiringe. Lile so many other low- and high-end integrated programs, the 519 package combines word processing, spreadsheer and communications. But it separates itself from the evend by height fig 1st commercial pragrams to be shipped with the tree interface that the Sarvest with sense were interface that the Sarvest with sense Systems, Apple cations Architecture (SAM).

Sold with 125 printer drivers, Microsoft Works resembles Microsoft Word, which was selected as an Editor's Choice and cited for its strong support of laser printers in the roundup of standalone word processors which appeared in the last (van. line, called SAA, or Systems Applications Architecture.

If you want a peek at the future, take a look at Microsoft Works: the commands, both how they're accessed and executed, follow closely the new SAA conventions.

Beyond the look of that SAA interface. Microsoft Works offers an extremely good balance of word processing, spreadsheet, database, graphics, and communications functions. The word processing is reminiscent of Microsoft's top-of-the-line Word-and so are the printed results, in large part because Works uses Word's superb printer drivers, which milk more out of dot matrix and laser printers than most users thought was possible.

Microsoft Works isn't a program for everyone. By choice, none of its modules are as powerful as the standalone market leaders. But if balance, ease of use, and economy (\$195 list, about \$129 at typical street prices) are what count. Works is likely to be one of the software business's best sellers during 1988.

A GOOD FIT For some, the word processing capabilities of integrated software packages seem an especially good fit. The booming "home office" market, for example, is built around PCs and the leverage they give the worker without a support staff. The economy and ease of use of integrated software make it a natural for the home worker.

Integrated packages also make good sense for college students, who need solid word processing software and possibly a decent spreadsheet for business courses, but have modest graphics, database, and communications requirements

In secretarial jobs, a powerful word processor is often the key element. Add a database for mailing lists, and you've got a powerful productivity-enhancing tool. Throw in a spreadsheet to help prepare tabular material with the rows and columns added up correctly, and you've added even more value. Put all three of those into an integrated package that allows sharing data and combining it into letters and reports, and you have a highly orthograd tool.

It just looks like a general-purpose integrated package.

In the pages that follow, you'll find 18 candidates for that role on your PC: multifunction software with the right mix of strengths for your needs .- Jim Seymour

Jim Seymour is a contributing editor of PC Magazine.

Ability Plus

Ability Plus, from Migent Inc., is a \$259 integrated package composed of five modules: database manager, spreadsheet, graphics program, word processor, and communications program.

You select a module and a corresponding data file by the point-and-shoot method from the main menu. Moving the cursor across to Write and then down to a filename-or choosing << new>> for a new file-and pressing Enter puts you in the word processing mode.

Lotus 1-2-3 users will feel right at home with Ability's commands; they are both point-and-shoot and first-letter sensitive. The Write command establishes a document's layout; the Include command is used to include fields, spreadsheets, or graphs from one of the other modules; Adjust-text takes care of centering, indenting, and justifying; Typestyle is used to underline and boldface; and Spell, Print, File, and Quit do exactly what they describe.





Ability Plus. Version 1.01 Migent Inc. Call Box 6 865 Tahoc Blvd. Incline Village, NV (800) 633-3444

List Price: \$259 Requires: 384K RAM (512K RAM recommended), two disk drives (hard disk recommended). DOS 2.1 or later. In Short: A fast corporate word processor with solid features, Ability Plus excels at truly

integrating spreadsheet, graphics, and word processing functions. Its inability to edit files larger than memory (:bout 50 pages) could he a problem for some users. Not conv pro-

A thick, shaded graphical border defines the page size-top and bottom, left and right. The different text options that you can choose from-bold, italic, solid underline, word underline, subscripts and superscripts-appear on the screen in the appropriate style.

Using an option is a two-step process. Characters, words, or paragraphs are shaded with the F7 key, and when the Typestyle command sets the option, the shaded area is redrawn in the specified manner.

TIGHT INTEGRATION A PLUS Ability Plus's real strength lies in the tight integration of its various modules. You can cut a spreadsheet or a graph from the other modules and paste it into a word processing document. In itself that's nothing special, but Ability Plus allows you to move a live version of a spreadsheet into a document

Include your accounts payable spreadsheet, for instance, in the text of your financial report; change a figure in the report, and it is also changed in the spreadsheet. Update the spreadsheet with the next period's data, and the program automatically updates the report.

The same holds true for graphs and the database manager. A graph derived from spreadsheet data is automatically updated when the spreadsheet is changed, and if the graph is included in the report, it's automatically redrawn and saved in the document file. This is how all integrated products should work.

A by-product of this feature is that you can define and name fields within a document; the fields will then function just like spreadsheet cells. Suppose you are writing a memo about travel expenses: in the body of your text, you enter dollar values and name the fields "room," "meals," and "tips," for example. Then you can enter a sentence fragment in your text that reads. "The total allowable per diem is" and then extract the formula "+room+meals+ tips" from the spreadsheet.

For those cases where you want just a few numbers from a spreadsheet included in a report—but not in a row/column format-the fields in the report may be linked directly to individual spreadsheet cells. A single document may contain fields linked to several spreadsheets or databases: the

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CONTRIBUTORS

Greg Alwang is a consultant and writer for Soft Industries, a Southington, Connecticut-based microcomputer consulting firm

Patricia Becker is a consultant and writer for Soft Industries, a Southington. Connecticut-based microcomputer consulting firm.

Bruce Brown is a principal at Soft Industries, a Southington, Connecticut-based microcomputer consulting firm. He is a frequent contributor to PC Magazine.

Mike Falkner is a microcomputer consultant based in Sacramento, California. Robert W. Fay is a manufacturing executive in Minneapolis, Minnesota, and has also been involved in the development of PC-based systems for international communications.

Joan Friedman is a rare-book librarian at a major research university.

Tamara Johnson is a computer consultant for Pisenti & Brinker, CPAs, in Santa Rosa, California Barbara Krasnoff is a free-lance writer

based in New York City and specializes in microcomputer-related topics. She is a frequent contributor to PC Magazine. Marianne L. Mevers, CPA, is an accounting services consultant in Lawrenceville, New Jersey. She previously worked for the accounting firm of Ernst

cles on using personal computers for financial purposes.

Alfred Poor is a principal at Soft Industries, a Southington, Connecticut-based microcomputer consulting firm. He is a frequent contributor to PC Magazine. Robin Raskin is a free-lance author, editor, and consultant specializing in computers. She writes frequently for PC

Magazine and other computer publications and is completing a book on Lotus Manuscrint Owen Smith is a computer programmer

who works with neuroscientists at The Rockefeller University in New York

M. David Stone is a contributing editor of PC Magazine and also the author of several computer books, including Getting the Most from WordStar and Mail-

Donald B. Trivette is a frequent contributor to PC Magazine and is the author of A Quick and Easy Guide to Dow Jones News/Retrieval, recently published by Compute! Books of Greensboro, North Carolina.

Charles Weinberg, CPA, is a principal at Weinberg & Wilfong, P.A., Certified Public Accountants, and president of Management by Micro, Inc., both in Rockville, Maryland. He is an officer of the Capital PC User Group in Washing-& Whinney and has written several artiton, D.C.

limiting factor is memory, which must be large enough to load the document and the other files at the same time.

MEMORY LIMITS ABILITIES Indeed, memory is a limitation to Ability's abilities. There is no spill file, so the program cannot edit documents larger than what will fit into memory, which is about 50 pages. The file error-handling routines are good and could not be fooled into losing data, but Ability has no soft exit to DOS, so you carnot forwat a diskette. without shutting down the program.

The built-in spelling checker is good. It highlights the misspelling in the text and

automatically offers suggestions for the correct spelling. But it's annoying to wait for suggestions to appear when you know the word is correct, as with a place-name. The designers have made changes to the next version so that the user can ask for suggestions or quickly continue with the check.

Ability Plus is a great program for users who need a lot of integration among spreadsheet, database, graphs, and text. Its ability to move a live version of a spreadsheet into a document is a loon is. It want so great for those who need to edit documents that are too large to fit in memory. -Donald B. Trivette

AdvanceWrite Plus

AdvanceWrite Plus, Version F0200, is a big, feature-laden program available from Hewlett-Packard for \$710. Installation will require 990K of storage space on your hard disk, and you need a minimum 512K of RAM to run the program. The single package includes not only a very capable word-processing program but also a complete spreadsheet module and text-indexing module called Wordbase Manager Three manuals accompany an installation booklet and a quick-reference card.

An automated install program requires little more from the user than disk swapping. A booklet provides brief instructions for setting screen, printer, and document format defaults.

A disk-based tutorial moves you through all the basic functions of text creation and printing, including cursor movement, block copying and moving, and formatting.

GETTING HELP There is a major problem, though, with the help facility. The program's documentation refers to all function keys by the names it has assigned them: Do, Format, Select, Mark, Enhance, and so on. Nowhere does the documentation link these functions to their actual locations on the keyboard. If you want to know about underlining, for example, you must first know that it is a function assigned to the Enhance key (F2). If you've forgotten that, you'll need to consult the manual, or at least the quick-reference card, before you can summon the on-line help with any satisfaction.

AdvanceWrite Plus offers access to all the functions you would expect of today's full-featured word processors: footnotes, multiple-line headers and footers, importation of other file formats, complete math and column capabilities, mail-merge, and much more. In almost every instance, once you have found the function key for a procedure, implementing it is surprisingly easy.

The 80,000-word dictionary is very good, almost always offering the correct alternative to a misspelled word as its first choice and mimicking the capitalization. tense, and number of the original.

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DOS 3.1 or later.

In Short: An expensive, feature-rich program designed—and most suitable—for use on Hewlett-Packard hardware. Hard to learn because of nonmututive assignment of fonctions, but can produce documents in several languages. Not copy protected.

through function-key/numeral combinations. Only ten can be defined per "set" (and only one set is active at any time), with a limitation of 1,000 keystrokes per set. You may include straightforward key commands in a macro, and there are macro functions for pausing for keyboard input and chaining a second macro.

There are nine different foreign-language versions of AdvanceWrite Plus available, but even in the English-language version, you can select among 15 different keyboards. Two keyboard selections offer access, with an EGA video display, to characters not present in the IBM Extended Character Set the full Greek alphabet (minus classical Greek diphthongs) and mathematical and scientific symbols.

LIMITED PRINTER SUPPORT The package fully supports only 12 printers, and they are all HP equipment. The vendor provide drivers for 30 additional printers, to the printer of the support. These include the Diablo 630, various models of the IBM Proprinter, and other popular late-model printers. There are no drivers for many older dot-matrix printers still in use, and the number of drivers supplied for non-HP printers is saidly defi-

Error handling is excellent. Error messages, informative and helpful, protect you from fatal errors like saving to a full disk or a nonexistent drive. In some ways,

cient.

AdvanceWrite Plus shields the user too much; you cannot, for example, exit a file without saving any changes you have made. If you have second thoughts about an hour's worth of emendations, you will have to remove them all before saving your file unless you have set up your defaults to automatically make a. BAK file of the previous session's version.

Hewlett-Packard gives no free technical support to purchases of AdvanceWrize Plus. When you first call the technical support line, you will be referred back to your caler unless you have also purchased serialized coupons, each of which entities you to support for a single problem or question. If you have a valid certificate, an operator will note your question, and a support person will phone back within 2 hours and say in touch until you get an answer.

The people I spoke with under this plan were courteous and helpful, but they needed several days to determine that the VGA display was not yet, in fact, supported by the program.

use program.

AdvanceWrite Plus is a powerful, multipurpose word processor that is easy to

learn for quick productivity. While it is not

spreadsheet and don't require Lonta 1-23

spreadsheet and don't require Lonta 1-23

compatibility, it's a good value. But for office environments where many different
kinks of PCs are in use, the keyboard oddities and limited printer support make this a

poor choice—Jona Friedman

BetterWorking Eight-in-One

Better Working Eight-in-One, from Spin-naker Software, is one of those pleasant surprises that a reviewer who's skeptical of integrated solutions enjoys seeing. It contains a word processor, spelling, checker, database, spreadsheet, an outliner, graphics, communications, and a helpful set of desktop utilities. Designed for the first time computer user, the \$59.95 program offers a consistent and clear user interface, and some legrowth.

If the program's speed at loading and moving blocks of text using a 50K test file weren't impressive enough, I was bowled over when I learned of its low cost. You can also obtain the program as a \$29.95





In Short: BetterWorking Eight on One is a well-integrated family of programs designed for the first-time computer user. The applications melode word processing distance, spreadwest, graphics, communications, on their speller, and a handful of handy deskep urthine such as a calendar, to do list, label maker and memograd. The word processor creates a WYSIW YG display, and the extensive use of pope means make a tidy package. Not copy protected.

standalone word processor; at that price it's virtually disposable software.

The word processor has what you need to create simple, attractive documents. Eight-in-One works well at copying, moving, and deleting large blocks of text, can read and write blocks to and from other files. It supports normal, holdface, underine, compressed, italics, and double-width type styles (unfortunately there are no subscripts or superscripts).

The search-and-replace feature is fair there's no search for whole words), there's a speedy word count (available for the entire document or for a marked block), and there's a well-endowed but sow-moving speller. You invoke all of the page layout features—including case transpositions, margins, headers, footers, indents, line spacings, and justification of the page layout features—including case indents, line spacings, and justificadialog boxes. The rouls of the end dialog boxes. The rouls of these justices or in the word of the page of the page of the in true WSIW VGG fashion.

LIMITED OUTLINENG The program treats the outline component as a separate application, and its limitations make it somewhat juvenile. While you can demote 1987 Standard-286/8 1988 Standard-286/10









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How to pick th



Though most mice out there look pretty much alike, they're not all equal in performance. It pays to be just a little choosy to make sure you end up with the right mouse for your needs.

Starting with software. If you want full compatibility with all of your software, all you have to do is look for a mouse with the Logitech name. There are four in all, each one designed for different hardware needs.

THE HIREZ MOUSE

If you've got your eyes on a high-resolution screen, the mouse to get your hand on is the new LOGITECH HIREZ Mouse.

With a resolution of 320 dots-per-inch (as compared with 200 dpi or less for ordinary mice), it covers the same area on your high-res screen but needs less of your desk to do it. More than 50% less. Saving you valuable desk space, and



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Good instincts run in this family left to right! the new LDGITECH HIREZ Monue (\$179), the only mouse designed expressly for high-res screens; the LDGITECH Series 2 Monue for the IBM PS-2 (\$99), plays right into mouse port; and the LDGITECH Monue for standard screens (\$119), in bus and sreal versions). All come with Legitech to un Phu Software, which casterie ease of use with

contails any software, monor-based or not.

effort: mouse maneuvers that used to require sweeps of the hand are now reduced to a flick of the wrist.

Which makes this new mouse a hand's best friend. And a more reliable, long-lasting companion. And, like all Logitech mice, its fully compatible with all popular software, and equipped with a Lifetime Guarantee.

THE SERIES 2 MOUSE

For those who've chosen the Personal System/2," the most logical choice is the LOGITECH Series 2 Mouse. It's 100% compatible with PS/2, and plugs right into the mouse port, leaving the serial port free to accommodate other peripherals.

e right mouse.

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It's hardly an accident that only Logitech offers you such a complete selection-we're the only mouse company to design and manufacture our own products. We make more mice, in fact, than anyone else. Including custom-designed models for OEMs like AT&T. DEC, and Hewlett-Packard

The three mice pictured to the left come with all this expertise built right in. Which explains an interesting paradox; while

you may pay less for a Logitech mouse, you'll surely get more in

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and promote levels in the outline, you cannot collagse an outline to look at a particular level. If you demote a Level One heading to a Level Two heading, the demotion is not rippled through to the children of that level. I wouldn't ecommend this outliner for complex structured documents.

Once you create an outline and some corresponding text, you can write the file to the word processor and flesh out and format the text. This is an acceptable if not a seamless integration.

Scanness migration.

You can invoke the speller at any time during an edit—even exit in midstream—without losing corrections.
While the speller does not list the misspelled word in context, it does (rather ponderously) list numerous alternative spellings in a dialog box until you halt the process by pressing Return. You replace the misspelled word in the document by pointing to it and then pressing F2 to indicate acceptance.

cate acceptance. You can achieve a fair degree of control over the design once you understand how must any block of text, for instance, and change the indentation, justification, cause, and ine spacing of that block. If you all not part of the property of the property of the other command without marking a block, so even though you are limited to working in a wint a string legible and property of the property o

Thanks to the well-designed menu screens, you'll find the program quite a pleasure to use. You access all commands through a single command line invoked by pressing Esc: these commands, in turn, invoke a pop-up menu of choices. Pop-up menu commands are entered graphically by pointing or by entering the first letter. From there, appropriate dialog boxes solicit inputs as necessary.

SPEED KEYS ABUNDANT When the pop-ups get tirrsome, a reasonably full series of Alt-based speed-key commands can replace them. You will find that some of the pop-up functions have no corresponding speed keys and vice versa; this causes sight confusion. For example, there are Alt-key commands for searching backward in the text, for displaying all hard can-

riage retums, and for toggling between insert and overstrike, but there are no pop-up equivalents. I could use F3 to mark a block, but when I tried to use the documented F5 as a speed key to cut a block, I found I needed to invoke the proper popup window first. This thwarts the purpose

of speed keys.

Excepting these and a few other minor snags, you may find you don't need to open the manual at all to use BetterWorking Eight-in-One. The only other less-

BetterWorking Eightin-One's word processor is a serious contender in the low-cost in-

than-clear command is the Memorize Block; Memorize is BetterWorking Eightin-One's user-friendly name for Copy. Although I don't think they invented a better wheel with the term memorize, the term is perfectly acceptable.

tegrated package arena.

A trio of embedded commands give the program some extra oonph. The @contents commands create a table of contents from your section headings, the @include command lets you chain-printflies with incrementing pages, and the @merge command creates mailing lists using either the word processor or database as the data document.

It's a good thing the program is so easily navigated because the documentation includes only a minimum amount of information about each function—and no index. The program fumishes a surprisingly complete set of printer drivers, and the output to my laser printer was exactly as exrected.

BetterWorking Eight-in-One's word processor is a serious contender in the lowcost integrated package area. PFS:First Choice and Microsoft Works, move over! BetterWorking Eight-in-One may turn out to be the low-cost integrated sleeper of the year.—Robin Raskin

Diamond

Diamond is a \$195 integrated spreadsheet and word processing package developed by Mosaic Marketing—makers of the Twin Classic, a Louis 1-2-3 look-alike. And, like its spreadsheet sibling, Diamond evolved from the word processing module in Mosaic's Integrated Seven series into a standalone package.

To install Diamond, you simply create a directory and copy the list from the five application disks into it. The package sup-ports a limited earny of hardware, including monochrome, CGA, or Hercules-compatible monitors, along with eight printers and five plotters. If you have a Hercules-type card, you must execute a special program before loading Diamond to activate its graphics campability.

From the menu you can move back and forth between the spreadsheet and word processing environments, exit to DOS temporarily, change the hardware configuration, or leave the software. Since the program assumes the floppy disk drive is your data disk, you must insert a formatted floppy disk the first time you start the program. You then describe the screen, printer, and directory settings and save them before you start creating documents.

WP SCREEN LAVOUT The word processing screen is laid out simply, with a ruler line at the top of the screen and 20 lines for entering text. Two lines at the bottom of the screen describe mean shortcuts, and a status line shows the file being editcit, the page number, the line and column position, and the amount of memory available for text.

You select commands by typing Esc to expose a pull-down menu in the upper-left-hand corner of the screen. You can move the cursor up or down to your choice, or type the first letter of the choice to execute the command. You can also choose from Diamond's 19 Alt-key combinations, such as Alt-B for bold and Alt-U for underline, which execute commonly used menu sequences.

Most of the basic word-processing functions are available. You can copy, delete, and insert blocks of text, although a move can be made only by copying and then deleting the old text. Diamond also although as a series of the control of the contro





Not copy protected.

CPICLE 650 ON PEADERSERMON CARD

Diamond, Version 1.1 Messac Marketing Inc. 1972 Massachusetts Ave. Cambridge, MA 02140 (800) 422-8946 (617) 491-2434 List Price: \$195

Requires: 384K RAM (512K recommended), two disk drives or hard disk, any graphics card; IXOS 2.1 or later. In Short: A nucely integrated word processor and spreadsheet with all the basics needed for simple word processing. A spelling checker

lows global search and replace, and soft page breaks.

The spelling checker and thesaums are based on a product supplied by Merriam-Webster, and they are the shining stars of the package. You can check a single with by the pickage. You can check a single ment. The misspelled word is highlighted on the screen, with a list of possible spellings shown in a small window. And the window is intelligent: always positioning itself so that you can see the word. Each suggested word has a number; you just on the can ship misspelled words one; or can skip misspelled words one; or can skip misspelled words one; or the entire document. Or you can add new words to a user disciousney as well.

The Diamond print routine again contains the basics for document output. You can send your report to a printer or to a disk file and define both the margins and the line spacing for the document. You can send control codes to the printer with the setup string, and can set the program to pause after each page.

SPECIAL FEATURES But Diamond has a few features that separate it from the crowd. Macros can be assigned to the function keys and can be shared with other documents. The macros use the same keyweeks as the spena/sheet, and they resemble 1-23 commands. When you want to transfer data between the spreadsheet and the word rocessor, Diamond splits and they order and the word rocessor. Diamond splits

the screen so that you can select cell addresses or text and move either one easily. You can also embed the name of a graph from the *Integrated Seven* graphics package in your document, and *Diamond* will read the graph information and print it in your document.

The package offers context-sensitive help that you call up with F1. It explains briefly, but clearly, the purpose of your current menu choice, and you can select and page through other topics. The documentation is very concise, describing each function with a pangraph or two followed by an example of how to use it. Although it's not much more than a reference manual, it is adequate to lead you through most situations.

stuatones. Although Diamond is not billed as a sophisticated high-end word processor, there are a few features that should be added to enhance its capabilities. A function for moving blocks of text would be better than using copy, insert, and delete. Many documents require different margins and tab settings for each part, yet Diamond allows only one ruler. In addition, line spacing is selected in the printer options, so you can't mis single and double spacing in the docu-

Overall, Diamond is an easy package to learn and a capable word processor for simple requirements. You'll get a for more features for the price with something like PC-Write, but if you wart an integrated word processor and spreadsheet package—and don't need the power of a fullblown word processing package—them Diamond will fit be bill.—Milk Falkner

Electric Desk

Alpha Software Corp. 's Electric Desk was developed with he non-power user in mind. Priced at \$129, it's not flastly, yet in mind. Priced at \$129, it's not flastly, yet in sports such features as block functions, multiple print styles, and multiple file harmonia of the print styles and print styles and print styles and print not only word processing, but spreadshed, data-base, and comunications morbalies as well. An added advantage is a spelling checker and the samult soot of the print styles and the print styles and the samult styles and the samult





Version 1.1 Alpha Software Corp. One North Ave. Burlington, MA 01803 (800) 451-1018 (617) 229-2924

List Price: \$129; \$179 with Spellchecker and Thesaurus. Requires: 256K RAM, one disk drive, DOS

2.0 or later.

In Short: An integrated package with a strong word-processing module. Its Lorus 1-2-3-style selection bars allow you to select a function or command quackly. Excellent for the user with simple word-processing needs. Not copy proceeded.

ORDER SEGMENDACES EMPLOY CAPO.

couldn't be easier; you just insert a disk and hit any key, and you're through in about 5 minutes.

Electric Desk's tutorial is on disk. There is some user input, but for the most part it's self-running. Commands and functions are similar from one module of the package to another, a feature that shortens the time it will take you to learn all modules.

Electric Desk also includes contextsensitive help, which can be summoned at any time regardless of the application. This feature can be turned off with no effect on the program's speed or display. Keyboard templates are available, but they cost \$19.95 (mini-manual included) and must be ordered from a third-party vendor.

APPEALING FEATURES Among the features that make Electric Desk appealing, first and foremost is its ability to open nine documents at once. This feature would be handy, for instance, for a secretary who needs to refer to several interoffice memos before issuing another.

Transposition is another useful feature. Although limited to letters alone (not words, sentences, and paragraphs), transposition helps with typical typing errors such as teb insected of the and et instead of to. Electric Desk can also insert the system date into a document at print time, useful with form letters or other commonly useful.

documents that need the current date.

The two optional features for Electric Desk—the spelling checker and the thesurus—come as a single package for a additional \$50.7 the spelling checker has a 10,0,000-word dictionary to which you can add slang, foreign words, proper nooms, and words preculiar to a particular discipition of the spelling checker of the spelling period of the spelling checker of the spelling period word, it also sentence context into consideration when it makes in best guess

for a replacement. The thesaurus, with a base of 200,000 words, supports synonym chaining and groups similar words together. When tested, the thesaurus proved weak on words of foreign origin like wanderheat and hourgeost, as well as professional terms like grant and foreign origin face. With nountwests, business terms, and colloquialisms, the program and forenoid resectably.

FILE-SIZE LIMIT Electric Desk has a file-size limit of 64K, or 2,000 filnes. This is not a great drawback for a personal word processor, but the loading process is slow for handling files that approach the program. Filmit Another limitation of the program, more of an irritation than anything else, is the process required for indenting a paragraph.

There are two methods: one requires spacing over the five or so spaces; the other, using the Tab key and hitting. Return at the end of the first line of the paragraph. I found both methods awkward, since I am accustomed to using the Tab key for indentation without thinking about of the following line of text. Electric Deck interprets the Tab key as a command to indent an entire block of lext.

Although newcomers to word processing will have no problem adjusting to the
peculiarities of *Electric Desk*, experienced
users might find its lack of certain keyboard conventions a bit off-putting. For
example, instead of pressing Ctrl-End to
move to the end of a document, *Electric Desk* has you press End End PgDn.

Easy to learn and use and without any pretenses, Electric Desk is not for the specialty or power user but rather for the user who needs to produce correspondence and occasional longer documents.

-Patricia Becker

Enable

Enable, priced at \$695 from The Software Group, offers integrated spreadsheet, database, and telecommunications modules in addition to word processing. Using windows, you can open up to eight files and copy information between modules, or edit information in any open window.

contintormation in any open window.

Menus guide you into Enable's word processing module, and you can access editing and formatting options by using either the "Top Line" menu or the "Expert Commands" keys. When you select an option from the Top Line menu, a pull-down menu appears, listing the option's functions. Expert Commands keys are dishaded on the bottom line of the screen.

played on the bottom line of the screen. Enable allows you to move the cursor to almost any text type or attribute by entering just a single command, but you'll have to memorize the cursor movement keys in order to memorize the swiftly. Most cursor movement is accomplished by using FJ plass corresponding lenter our cursor movement is accomplished to the plant of the

package.

Once you've blocked a specific portion of text by marking its beginning and end, it

current window or to another open window. Besides the basic block-center and block-delete functions, several blocked paragraphs can be reformatted into a single paragraph, with the previous paragraph markers and blank spaces removed.

TEXT ENHANCEMENT Enable has several text enhancement options. Text attributes are tumed on and off using the Atletter combination at the beginning and end of the text to be enhanced. A help menu showing the various attributes, their corresponding keys, and their applications can be either disolated or hidden.

A table of contents function allows you to enter headings; it hen complies the table automatically, inserting the appropriate page numbers. Table heading entries are limited to one line. The table is created as a separate file; but it can be printed with the document file using %INCLUDE, one of several embedded print commands. A document index can also be reated, compiled, and printed with the document tusing %INCLUDE.

Enable's spelling checker feature, called "EnableCheck," uses Proximity Merriam-Webster Linguibase's 80,000-word dictionary. Spelling errors are displayed and several options given, including choosing a replacement from the dictionary or adding the word to it. If the option for checking duplicate words is elected, EnableCheck flags the word and gives you the option to delete or ignore the duplication.

duplication. When the check is complete, a summary screen appears showing the drive/path and filename, the number of words checked, duplicate words, words not found, corrections made, and words added to the user-created dictionary. Words can be deleted from the custom dictionary, which, when retrieved, appears in document form with one word on each line.

The search-and-replace option can perform case- or non-case-sensitive searches to find characters, words, numbers, or symbols. If columns are defined, Enable can be instructed to find text in all columns or only in specific columns. The searchand-replace feature allows you to enter replacement text and a designated number of

If verification of each search-and-re-



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SCREENING THE USER INTERFACE, PART 1

The command structures of high-end integrated WPs run the gamut from Symphony's 1-2-3-style menus to Framework's overlapped frames.



Hitting the Do key (F9 on DOS keyboards) calls up a long menu of AdvanceWrite Plus functions, including Move, Copy, Search, Repage, Translate (to and from other file formats, including ASCII), and Shell to DOS.



Enable allows you to select easily from among the application programs it supports. Each program then furnishes its own main menu showing the functions it supports individually.



Framework II's viewing screen allows several frames to overlap. The top frame shows a disk directory, and the highlighted file can be loaded with just a press of the Enter key.



Q&A Write, the word processing module of Q&A, has a surprising number of features for a program so easy to use. Besides the options shown here, the program allows macros, does math, and has an undelete function.

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This screen shows the Smart Word Processor's footnoting capability, as well as split windows. If you print footnotes in the body of the document, the footnotes on each page will start with the number 1. If you print them at the end, they will be numbered sequentially.



A typical Symphony word processing window shows the unmistakable Louis touch: the status and menu lines across the top. Except for the ruler, the screen could just as easily be a spreadsheet.

SCREENING THE USER INTERFACE, PART 2

From pull-down menus to dialog boxes, low-end integrated word processors pack a lot of functionality into each screen. Here are some examples.



Ability Plus allows a choice from a selection of colors; light magenta is shown here. Ability's page break is a prominent visual effect, although both the subscript and superscript flast line of document) seem to hide in the copy. Other features include italies, boddface, word underline, and solid underline.



The BetterWorking Eight-in-One word processor offers pull-down menus and dialog boxes that allow you to access functions. The Layout commands are especially easy to work with, and all changes such as margins, spacing, and indents immediately result in a layout change. The control of the co

Diamond displays its ruler at the top of the screen and status information at the bottom. It also shows shortcuts that give you quick access to menu choices.



Two documents may be viewed with Electric Desk, but up to nine may be opened (depending on amount of memory) at any one time. Menus on the screen's top and bottom include options for editing and file management.



Get Organized! has o context-sensitive help feature, which takes you through various levels vio keywords. The help feature, olong with most of the other functions, is accessed through the menu or function keys and produces o series of pop-up menus.



Intuit IS-2000 provides o complete environment for managing applications. This directory screen contains the Intuit demos: o directory, text files, records, forms, and tables.



The Microsoft Works spelling-checker function shows the word being checked, along with suggested alternatives.



PFS:First Choice's flashy pull-down menus offer additional options to those occessed through function keys. The ruler line shows the margin and tab settings and the current curron position; the area beneath displays helpful messages pertaining to the task at hand.

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■ INTEGRATED WORD PROCESSORS

("Screening the User Interface, Part 2" continued)



The PRO Staff Word Processor screen display includes function key definitions at the bottom; when you hit F10, additional letter commands are displayed. Other formats are also possible within the same document, as shown.



Rather than having separate modules for word processing and communications, TeleWriter II fully integrates the two functions. Note that the help line shows commands for both word processing and communications.

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When WordCAD's WordEDIT first comes up, you have the choice of including a help file in one of two windows. In the second window, a block of text has been defined (the blue shaded area), a phrase has been underlined (between the arrows), and another phrase has been boxed using WordEDIT's graphics capability.

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WordPerfect Executive's Shell is the controlling program for all of the package's functions. The Shell menu is completely customizable; as delivered, it lets you call individual WordPerfect Executive modules and enter DOS file-handling commands.

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Call Now to Order or for a Dealer Near You 1-800-247-3224 In Georgia, call 1-404-564-5800 place entry is indicated, Enable will either stop to verify a replacement or continue to the next occurrence. Text can be found, marked, and deleted later using the Delete Marked Text option, Wildeards can be used to locate words or phrases whose spelling the users is unsure of, and the number of unknown characters in a word can also be specified.

Because of its many advanced functions, Enable's learning curve is steep.

CALCULATOR FUNCTION Enable has an extensive calculator, which can process in the word processing module virtually every command from the spreadsheet module. Calculations can be made borizontally and in column format. And only the result of the calculation appears, not the formula or equation enterly on the formula or the formula or equation enterly.

Macros can be easily created from the main system menu, which supplies a list of all the macro keystroke commands. Through the use of these commands, macros can be created to perform any series of functions.

You can print documents from the main system men or from whith the word processing module. Endelle displays a Print Form and a Page Form to modify information required to print the fife. Selected pages can be printed, and the number of copies can be defined. The Page Form detens the appearance of the document on the page, instuding page length and with, to color the page, instuding page length and with, to color the page instudents of the page mathers. Any modifications to the Print and Page Forms can be sweed and used against

saved and used again.

Because of its many advanced functions and commands, Enable's learning
curve is steep. The on-disk utorial is helpful, but it doesn't begain to demonstrate the
flexibility of this package. The word processing module could easily stand by itself
as an excellent choice, but when the
spreadsheet/ernobics, database, and tele-

communications modules are included, Enable becomes an outstanding overall package for the corporate/professional environment.—Tamara Johnson

Framework II

Framework has been through only one significant revision since its initial release, and, while it is beginning to show its age, it remains a competitive product for word processing.

As its name implies, Framework uses a work environment based on the "frame" as its organizing principle. Word processing text is entered in a frame. Spreadsheets and databases are constructed in frames. A frame can even contain other frames.

Experienced users may find they have to make some mental adjustments to grasp the full power of this frame design if they are to take advantage of the unusual features offered by this program. New users, unfettered by ideas about how word processors are supposed to work, should find the soine much easier.

Since a frame can hold other frames, you can carve up a single document into separate pieces to help you organize its sections. Framework allows you to calpage the frames so that only their borders and titles show. There is also a View mode that turns the frame structure into an outline. You can freely move and copy frames, both from the "desktop" or from frames, both from the "desktop" or from

The side benefits are that you can include spreadsheet, database, or graphics frames within the structure, right along with the text frames. You can also use the frame outline to produce a table of contents page.

within frames.

The second based their problems, however, and the second the label of the outermost frame. Since this label can be longer than the eight-elter filterame limit and can contain spaces. Framework will turcate it at its first eight characters and replace spaces with understanding the second second the second second to the same first eight letters. Framework will warm you fiy out ty to save a filter than maches one already on the disk, but you could still easily replace a file by accident.

thinking that you were replacing an older version of the frame you were saving.

WORD PROCESSING Of all the modules within Framework, the word processing portion is perhaps the strongest. While it may not have all the features of standalone products, it can hold its own for most

Framework word processing has speed and power. It lacks commands and dedicated keys for deleting sentences, paragraphs, or pages, but its Extended Select and rapid cursor-control keys cover the territory well. Text reformats automatically and without holding you up as you tyre.

The program even has a powerful macro facility. These macros can be used for straightforward tasks—such as expanding abbreviations, entering the system date or time, or merging boilerplate text. Moreover, they can be used to capture and play bear command keystrokes that can automate repetitive tasks.

Framework offers other useful features that will appeal to some users, such as its word count and broad Undo commands.

FRAMES LIMIT WP POWER You control the formatting options of a document, for example, by adjusting menu settings or entering embedded commands while the cursor is on the border of a



Version I.1 Ashton-Tate Corp. 2010 Hamilton Ave. Torrance, CA 90502-1319 (213) 329-8000 List Price: \$695: Pre-

um Pack (includes 3½- and 5½-inch disks), \$725. Requires: 384K RAM, two disk drives,

DOS 2.0 or later.

In Short: Though showing its age, Framework may be the preferred choice for users who want an integrated package with more power than the inexpensive starter programs. The program offers speed and flexibility, but

is not without shortcomings. Not copy protected.

CHILLE MAKEN PRANCE SERVICE CAPO.

frame. Although this sounds simple enough, it is complicated by the fact that these settings affect all the frames contained within that frame unless those frames have other settings of their own. Consequently you have the power to controt the margin settings for each frame, but, if the page does not print the way you want, you may need to search for a while before you find where the settings are wrone.

Other problems arise from the lessthan-intulive user interface. Framework relies on pull-down menus for most settings, which would be fine except for the fact that they are organized in unusual ways. One example: the left and right marin settings are found on the Words menu, but the top and bottom margins are on the Print/Formst Options submenu.

Framework is also missing features that are now considered fairly basic for professional word processors. It has no thesaurus, no footnoting ability, and no support for proportional fonts.

The program gains strength from the other modules. You can perform congles math operations by incorporating a spread-sheet frame. A database frame (derived from the spreadsheet format) can be used to maintain mailing lists, and you can print mailing lates as well as merged form leters. You can also include graphs in your documents.

Framework is showing its age. It is overdue for a little rejuvenation, with some better support for laser printers and fancier page formatting options. Its manuals are clearly written but do not explain many features in sufficient depth.

Sill, if you are looking for a word processing program that offers the additional features of an integrated package and want something with a little more power that he low-priced starter programs, then Framework is perhaps the best integrated package value available. If you can live with its shortcomings, it will reward you with speed and flexibility.—Alfred Poor

Get Organized!

Get Organized!, Version 2.0 (\$99.95), is one of the better desktop organizers—software meant to do all those little, day-to-



Get Organized I, Version 2.0 Electronic Arts 1830 Gateway Dr. San Madeo. CA 944444 (000) 448-88822 (445) 571-7171 List Price: 599-95 Requires: 2568 RAM for DOS 2.0. 3308.

for DNS 3.0, or \$12K and a hard disk for RAM resident use in Short: The word processor attached to this well-planned desk organizer is simple use and appropriate for most sample office functions, such as memiss or short letters. He proves ank wand in handling more sophisticated doctuners. Not copy proceed. CRSCL 486 (FEACH STREET, CAPO)

day tasks that we all hate. Through the use of function keys and Lotus-type menus, it enables you to flip from a calendar function to a calculator, to a simple telecommunications program, or to several distinct word processor-type functions.

The program, obviously, has been designed to be accessible to the most computer-shy user. Its top-of-screen command lines lead to a series of pull-down menus that walk you through every available in function. Users who are in a hurry can use such the function keys to jump more quickly up the function keys to jump more quickly up to you must be function.

The simplest of Get Organized!'s word processors is a notepad, which contains five "pages" and a very simple text editor without insert or word-wrap functions. There is also AddressBook, a mailing-list manager; IndexCards, a simple database; and Writer, a basic word processor.

Each of these applications is linked in a variety of ways; for example, Address-Book used with TeleComm (the communications function) provides users with telephone autodial. Unlike the original program, the latest version of Get Orgamized can be either accessed from disk or placed in RAM.

Unfortunately, once you enter the Writer word processor, you find none of the handy information that most word processors display in their command lines. In-

stead, the top line shows what mode of Get Organized! you are currently using, the second line holds a command menu, and the third gives a short help line explaining the currently active function.

the currently active function.

Writer does contain enough functions to handle a business letter or memo. Print refinements and hard page breaks are placed within the text by typing the code preceded by a backslash. Other features, such as block functions or search and replace, are accessed from the men at the top of the screen, or by using the function keys.

CUT-AND-PASTE Get Organized! uses a fairly simple cut-and-paste method for block functions: to mark a block, you first press the F10 function key and next hit either F7 or F9 to copy or cut, respectively. The F8 key will then paste the block of text wherever you place the curso.

Search and replace is accessed through a combination of the menu and function keys. The Find&Replace menu command will produce a window in which you are directed to type the character string you want to find and/or replace. You can beginning of the file; in addition, you can choose to have the program replace without unervine.

Get Organized's automatic reformating function is a bit problematic; it waits until you stop typing. The time it pauses can be modified on a scale of 1 to 5 seconds; the documentation recommends a period of 2 seconds for machines running on 4.77 MHz.

There is an interessing Merge function that enables you to bring in information from AddressBook or IndexCards. By using either the 8 or 60 symbol as a tag, you can place field titles within your text, the again the place field titles within your text, the again less alternation in the corresponding field. This function is most useful when creating templates for mail-merge, and you can bring the system date in from Dougland State of the state

It is almost impossible to lose a Get Organized! document. When you sign off, whatever document is in memory at the time is saved along with the program and will come up automatically the next time

the program is invoked.
You can save a document while you

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continue to work on it, but you are returned to the beginning of the document rather than to your former cursor position.

Overall, Get Organized' is a good word processor for users with very specific needs. It is slick and easy enough for those uncomfortable with computer technology, Get Organized's solwness and lack of more sophisticated functions do disqualify if or creating more elaborate documents, but it is ideal for offices where simple form letters and memos are the nule.

-Barbara Krasnoff

Intuit IS-2000

Novice users unfamiliar with DOS may have an attractive alternative for managing disks, directories, and files with Intuit 18-2000 from Noumenon Corp. The 539 95 program comprises an integrated word processor, a spreadsheet, a database manager, a directory and file manager, and a forms and report generator.

To help the user along, Intuit comes with key labels for labeling function keys with commands that allow a consistent interface throughout the package. These commands form a powerful set of general tools that offer the full power of hierarchical organization and a number of applications—without the need for lyping at the command line or using the DOS file system and command.

When started, Intuit displays its root directory. Directories provide mens for selecting or creating text files, as well as any application data or other directories. Neelect key changes context from directory to directory, or from directory to application. It can also transfer you back to a previously selected application once you've moved into another.

The Previous key returns from selections. Move, copy, find, and delete operations are available on files at the directory level as well as within the various applications. While only the Print command may be aborted or frozen, other operations display a ***PENDING**** message until complete.

MANAGES FILE STORAGE File storage is managed within Intuit, and the program comes with two files that maintain





protected

Intuit IS-2000 Noumenon Corp. 512 Westline Dr. Alameda, CA 94501 (415) 521-2145 List Price: \$39.95 Requires: 384K RAM,

two disk drives, DOS 2.0 or later.

In Short: Intuit is an integrated package that includes a word processor, spreadsheet, flat-file disabase, forms and reports generator, and directory and file management. Not copy

application files created by the user. Ordinarily, DOS files are never smaller than the cluster size, hence applications that use the DOS file mechanism to organize small units of data are penalized. Not so with Intuit. Space is dynamically allocated, and a

large number of small files will occupy

TRICLE 664 ON READER SERVICE CARD

much less disk space than they would as DOS files.

Volumes with up to 2MB of disk space may be allocated; therefore, the maximum file length is 2MB. Text files are limited to 4,000 lines. While flies zize information is not available, the percentage of free volume space is allocated. There is no facility, however, for undoing operations on files or reverting to previous versions, since

files are continually updated. In addition, care must be taken to exit from the program, particularly to ensure the integrity of the *Intuit* volume. As in DOS, where lost clusters may be retrieved, utilities are supplied for volume fix-up.

Intuit's word processor contains a dotcommand text formatter with global formatting forms and an on-screen previewer. A period at the beginning of a line, for instance, indicates that a formatting command or comment follows on that line. The commands are generally associated with paragraph-level details of text layout—such as chapters and sections and page breaks.

Print attributes are assigned in-line with a backslash. These combinations are provided through forms for the configured

printer, which assign text-formatting commands to printer operations.

While this mechanism is powerful, it means that you must search your printer documentation for the various sesape sequences corresponding to font changes and other necessary printer controls. A textformat form is associated with each text file; this form determines page layout and paragraph formatting for the whole text.

A variety of simple editing features and block operations are available as well. Text may be copied or moved within a text file or to another text file. Database information, forms, and spreadsheet tables may be copied into text files. The spreadsheet application uses English-inguage commands for simple operations on tables, and these commands may be grouped to build procedures containing conditionals and loops.

Many utilities are supplied to supplement the basic functions. These include control over screen colors, editing and scrolling, RAM drives, and simple line graphics. Also included are DOS import/export options, as well as word counting, time and date clock, and custom keyboard drivers.

In an inexpensive package, Intuit packs a number of powerful features with a command interface that is easy to learn. For many users, especially the novice, the combination of price plus diversity of applications may be very convincing. —Owen Smith

Microsoft Works

Microsoft Works, from Microsoft Corp., is an integrated peckage featuring a word processor, spreadsheet and charting, a databsse manager, and a communication tabsse manager, and a communication businesses and home users who need the diverse capabilities of an integrated pactage rather than those users who need see the strength of a professional word processor. What it lacks in hept, it makes up for with extensive tutorials, allowing PC novices to learn the troos with relative case.

The Microsoft Works tutorial programs are divided into menu-selected sections covering each of the package's functions. Installation is straightforward, requiring

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approximately 10 minutes.

Microsoft Works uses a command structure common to all modules. If you begin by using the word processor, it won't take you too much time to learn the commands specific to the other applications. The word processor's command structure uses function keys plus Alt, Ctrl, and Esc.

STRUCTURE MAINTAINED AI-

though screen layout varies slightly among functions, certain constants exist. Top-level menus are listed in a bar at the top of the screen. Selection of a menu item will summon a moderately sized command screen directly under the item. If a subsequently chosen command requires the user to make a choice or to input data, a large dialog box will appear on the screen.

Status and message lines reside at the bottom of the screen, the status line showing page number, open file, and setting information. The message line displays instructions.

Not provided are an indication of the line number currently being edited, the cursor position on the ruler line, and the number of words in the document. Not knowing which line number you're on makes it difficult to control pagination.

Microsoft Works is both user-friendly and user-protective. It will prompt with suggested responses if you make illogical selections. It also warns when files are



Microsoft Works lets you work with forms. form letters, and

mailing labels and lets you merge information from the database

with ease

about to be overwritten or left open. You can toggle automatic file backup on or off as well. The program affords complete flexibility in selecting drives and directories from within it.

A selection function, implemented using F8, defines an area for a command function. This routine is used throughout the word processor and other parts of the program, and it is generally quite helpful.

But it is also one of the program's shortcomings. In order to execute some commonly used commands-such as delete to the end of a sentence, paragraph, or similar breakpoint-you must go through this cumbersome definition process.

Cursor movement control governs a multitude of possibilities, except moves to the beginning or to the end of a sentence or paragraph.

MERGING FROM DATABASE Microsoft Works lets you work with forms, form letters, and mailing labels, and lets you merge information from the database with ease. It will print one form letter for each visible record in a database. The character command within the format menu permits you to select font, size, style, and character position (normal, superscript, subscript). These variations are also available through

a series of shortcut key combinations. While Microsoft Works supports the most standard word processing functions, it does not include such specialty functions as line numbering for legal documents. mathematical and statistical calculations, and columns for desktop publishing appli-

Microsoft Works is sold with 125 print-

er drivers, but approximately 200 drivers are available. These may be downloaded from CompuServe or obtained either through dealers or through Microsoft it-

Overall, Microsoft Works is a quality product that will fulfill the broad needs of business or home users. Its extensive tutorials make it a plus for users whose knowledge of PCs is limited.-Robert W. Fav

PFS:First Choice

For a number of years, Software Publishing Corp. has sold quality software for the novice user at affordable prices. Until PFS:First Choice was released in August 1986, you could only purchase Software Publishing's PFS programs separately. Now you can buy a single software package for \$149 that offers many features of the entire PFS family.

PFS:First Choice, Version 2.0, incorporates word processing, spreadsheet, file management, business graphics, and telecommunications capabilities into a tightly integrated, easy-to-use program. The integrated package's remarkably fast word processor serves as the link among its different modules.

Once you install the program, you use a setup menu to select one of two different color palettes for color monitors, and to choose a printer, modem, and plotter from a list of equipment. First Choice arrives ready to work with a number of IBM and compatible computers, and the program knows whether it is working with a monochrome or color monitor without the user's telling it.

The default configuration supports a parallel printer attached to LPT1: and a Haves-compatible modem, using Touchtone dialing, attached to COM1:. The only configuration parameter you have to select during installation is the type of printer

The First Choice manual, along with its context-sensitive help facility, makes learning the program a breeze even for the apprehensive beginner. A "Ouick Tour" tutorial section in the manual coordinates with several sample files supplied on the program disks to illustrate basic features. A convenient "Find It Quick Card" de-

you'll be using.



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fines the cursor movement, editing, and speed keys.

SURMOUNTS TRADE-OFFS While First Choice does make some trade-offs for ease of use, the program is well suited for personal word processing. You can use either the five pull-down menus to execute commands or speed keys to bypass the various menu ontions.

The document screen contains a status line that displays the filename, the amount of workspace being used, the current line, and the page number. A ruler line at the bottom of the screen indicates the margin and tab settings, indent markers, and cursor position. Word wrap and repagination are automatic when you change margins or insert text. Both single- and double-spaced text can exist in the same document, and boldface, underlined, and italics, as well as superscripts and subscripts, are available as character styles.

Page breaks along with headers and footers appear on the screen in their appropriate locations. Headers and footers are easily set up through the Features menu and can be two lines each with automatic page numbering.

The program uses a clipboard to save

blocks of text when you copy, move, or delete marked blocks. A block of text remains on the clipboard until you either mark another block of text or exit the program. You can even paste the text from the clinboard into another document, but first you must close the current file and open the other document.

Bookmarks facilitate jumping between files; up to nine of them can attach to characters to locate specific positions within files. When you locate a bookmark in another file. First Choice saves the application you're working on and immediately iumps to the file and cursor location of the desired bookmark.

The program has a straightforward search-and-replace function. You can automatically replace all the strings that First Choice finds, or you can verify replacement for each match.

SMOOTH MAIL-MERGE Mail-merging data with a document is a piece of cake with First Choice. Documents created in the word processing module merge easily with records in the file management module. You perform mail-merge printing through the document printing options, which allow you to specify whether you

are printing form letters or labels. First Choice has a 75,000-word spelling dictionary and a 20,000-word thesaurus. The program's spelling checker not only finds misspelled and unknown words, but it also finds double words.

The thesaurus performed well when it was fed our list of test words; however, it didn't recognize often-used professional terms like electronic, computer, and voltage. The thesaurus gives you the option of replacing a given word with one of the synonym choices, and by pressing F10 you can see additional synonyms for any of the original choices.

Documents created in First Choice are limited to 64K, so if you need to create a longer document, you can use the join command to combine two or more smaller documents. The document called by the join command adopts the host file's page numbering scheme and prints as if it is part of the bost document.

The PFS:First Choice word processor is ideal for the beginning computer user who needs to produce simple output. It is not designed to compete with desktop publishing software, and it should not be compared with high-end word processors. If you are looking for a simple word processor for everyday use, the program offers you everything you need-and probably more.-Greg Alwang

PRO Staff Word Processor

PRO Staff Word Processor is a \$39 component-based system from ShareData that is suited primarily for personal needs. The user manual includes a series of quick-start exercises that familiarize the user with most of the program's features. The format is clear and concise, and even the most inexperienced user should have no trouble learning this program.

You begin at the Administrator menu: here you select the PRO Staff module you wish to use. The Word Processor module includes a spelling checker as well as File Manager and Merge Processor utilities. Other modules available, for \$39 each, are 3-D Spreadsheet, Graphics, Data Manager, and Mail List Manager.

When you select Word Processor, you are brought to the main menu. Here your options are Create New Document, Edit Existing Document, and Print a Document. When you create a new document. the program asks you to specify the docu-





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hard disk, DOS 2.0 or later. In Short: An easy-to-use, integrated package containing word processor, spreadsheet, file management, business graphics, and telecommunications capabilities. It contain fully featured word processor that is relatively fast and can handle documents up to 64K in size. First Choice is ideal for first-time or experienced users looking for a simple integrated package for performing personal or everyday business computing needs. Not copy

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7400 W Detroit St #170 Chandler, AZ 85226

(800) 257-9411 (602) 961-7519 List Price: \$39 per module Requires: 256K RAM, one disk drive, DOS

In Short: An easy-to-use word processor that can be integrated with other modules. It offers numerous page formatting alterna-

tives, includes a spelling checker, and executes its features reasonably well. Not copy CIRCLE 649 ON PEADER SERVI

ment's title, the author's initials, and the operator's initials.

REVISIONS RECORDED Next PRO Staff assigns each document a sequential number and letter; the letter indicates the revision. This is a nice feature because it prevents you from inadvertently overwriting an existing document. The save routine lets you save the original, if you so desire, as well as your working corp.

When you select the Print option, a listing of each available file appears. After typing a P by each file you want printed, you are prompted for the number of copies and whether you want continuous feed. Since document printing is done from the directory, you cannot print your working copy while in the edit mode.

When you select the Edit option, you can display the directory to get the file number and letter, which you must then type in when prompted. The screen display in the edit mode contains a ruler at the top, plus the definition of the unshifted function keys at the bottom.

PRO Staff has several page-formatting options. Pressing the F2 key summons a Page Layout screen. Here you define your margins, line spacing, total lines per goith or characters per inch, and lines per inch. You also decide whether you want word wrap, proportional printing, and a printer output mode of normal, flush, or center.

A spelling checker comes with the basic program. When you choose this feature, a listing of all files will appear, and you type an S next to each file in which you want the spelling checked. PRO Staff will then display each word not appearing in its dictionary, at which point you may add the word to the dictionary, or substitute or accept the word individually or globally.

FORM FILL-IN PRO Staff also includes a form fill-in feature, in which you set off any text you would like to input later with brackets. Then, when you want to customize your text, you press Flo, F (for fill-in), and Enter—at which point the program moves you to the first item in brackets. You then input the information you would like, press the FlO key again, and repeat the process from the process the FlO key again, and repeat the process from the process for the process from the process for the process from the process from the process from the process for the process from th

This process is a bit too slow to be practical, but it does let you see the surrounding text. A faster alternative is available through the Merge Processor Utility. This utility lets you fill in the designated items manually from the keyboard or automatically from Mail List or Data Organizer.

> PRO Staff contains several advanced features for an inexpensive package.

Also included is a footnote feature. Position your cursor where you want the footnote number to appear, switch to the insert mode, and call up the "footnote panel" by pressing Shift-Py. You can either enter the footnote number at the prompt or leave it blank, in which case the system will automatically start with number 1.

Unfortunately, all subsequent numbering must be done manually, and the insertion of additional footnotes requires manual renumbering.

PRO Staff includes a search-and-replace feature that lets you search by case for whole words or strings of characters. It also lets you use wildcards, universally or by alpha or numeric match. If you select only the search feature, the program will stop at the first match; then you must repeat the process for each additional match.

Pro Staff offers other features including automatic page numbering, putting lines or boxes around text, and widow/orphan control. A hyphen-scan feature lest you search for words that could be hyphenated for the control in a line with a justified-right margin or minimize the space at the end of a line with a ragged-right margin.

PRO Staff Word Processor contains

several advanced features for an inexpensive package and executes them reasonably well. While this program does have limitations, it is easy to learn and use and is certainly adequate for most people seeking a personal word processor.

a personal word processor
 —Marianne L. Meyers

0&A

Since the Q&A word-processing module, Q&A Write, is bundled with its database peckage, one might prematurely conclude that it is wanting in features and power, everything that top word processors cen, nevertheless, it is an excellent choice for users looking for an easy-to-use program that integrates smoothly with an extremely easy-to-use database.

The O&A Write module has all the basic cursor functions, but the way it executes them is what makes the program such a pleasure to use. For example, by pressing the Home and End keys repeatedly, you can move around the document to a greater degree with each successive keystroke. Pressing End once, for instance, will move the cursor to the last character of the line; twice, to the bottom of the screen; three times, to the end of the page; and four times, to the end of the document. The GOTO command allows the cursor to move to any page and line in the document. You can also use it to mark your place in the text before you move.

TIES TO 1-23 One of Q&A Write's most useful features is its Spreadsheet command, which lets you insert a Lotus 1-2-3 spreadsheet, a named range, or even a graph into the Q&A Write document at print time. The program's ability to do so at print time lets you continually modify your document and spreadsheet independently and use the latest generations of



■ INTEGRATED WORD PROCESSORS

both when the document is printed.

Q&A Write's compatibility with 1-2-3 doesn't stop there, however. For users planning to switch frequently between the two programs, 1-2-3 can be set up as a selection on the O&A main menu.

There's more. Realizing that even casual users might find keystroke macros very useful, Symantec has included this capability in Write. To reach the macro menu, press Shift-F2 and then choose D for Define Marco. Press the key combination you would like to define, and the program turns on the keystroke necorder, which dynamically executes the macro commands at the same time as it stores the keystrokes.

Defining a macro puts it into the system's memory for immediate use, but does not automatically save it to disk. To save a macro, you must choose the Save option from the Macro ment. If macros are saved to a special file, they will be loaded automatically each time Q&A Write is started. An undelete function is available to restore the most recently deleted text. If you try to delete more text than the program can store in its buffer, it warns that if you continue, the text will be lost forever. The same buffers are used to store copied and moved text.

UNCOMMON EXTRAS The Q&A Write module has some interesting extras built into it that are not commonly found in similar programs. There is a line-drawing function, for instance, that lets you draw single or double lines and boxes. The program allows up to eight columns to be printed per page and accommodates titale, bold, supersprin, subscript, and under-bold, supersprin, subscript, and under-

scored character enhancements.
One of Q&A Write's best features is the way it performs mail-merges with Q&A File—Q&A's database module. The features of Q&A File provide material enough for another review, but suffice it to

say that File's Intelligent Assistant feature puts it in a class by itself. Intelligent Assistant is an English-language interface that allows you to use simple sentences or phrases to get answers to questions and handle everyday file and reporting tasks.

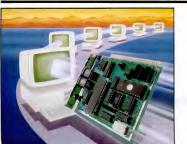
Q&A Write is no slouch in the speed department, either. Manual scrolling is almost instantaneous, and so is the searchand-replace function. The program will pertorm math operations on columns and rows of numbers with similar speed.

Q&A Write will do a great job for most word-processing functions. The tasks it will not handle are hyphenation, multiple windows, footnoting, indexing, table of contents generation, and style sheets. There is no outlining function, and you cannot work with more than one document at once.

But Q&A Write is a winner in its market. Easy integration with Lotus 1-2-3 and dBASE makes it fit well in just about any

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Smart Word Processor

The Smart Word Processor is part of the Smart Software System from Innovative Software. You can buy the word processor separately for \$395 or as part of the integrated system for \$895 (add \$139 for the spelling checker), which includes a spreadsheet and a database.

Like the other modules in the package, the word processor comes with the Smart System Manager, which includes communications, time and appointment management, and a calculator.

The program has two operating modes: text entry and command mode. You toggle between the two modes by pressing Esc. An external DOS access mode is also available from within the program. In the command mode, one of five lists of commands appears in the control area at the bottom of the screen. You can execute commands on that list in a Lotus fashion by highlighting the command or striking its first letter. Additional lists of commands are accessible with the Slash and Backslash keys. "Quick keys" let you bypass menus and execute commands directly from the text entry mode.





Version 3.1 Innovative Software Inc 9875 Widmer Rd Leneva, KS 66215 (800) GET-SMART (913) 492-3800 List Price: \$895 as part

cluding spelling checker); \$199 for additional workstation access for LAN Requires: 256K RAM for single-user sys-

tem, 384K per workstation for network system; DOS 2.0 or later for single user, DOS

3.1 or later for network In Short: Although part of an integrated system, Smart Word Processor competes with

the best standalones. Not copy protected. LE 651 ON READER SERVICE

The Smart Word Processor makes extensive use of windows in constructing a document. The windows are handy for outlining thoughts while writing the document, reviewing footnotes while they are

being referenced, or checking the text in another file before pasting text to the current one.

Smart tells you a lot about the document and the system on the screen. A

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Comprehensive on-screen help is only a keystroke eway (although QUICKENTRY is so intuitive, you'll probably never need it).

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control area at the bottom displays menu 1 commands from the different lists or the Quick-key prompts. A one-line description called auto-help appears whenever you highlight a menu choice. Information | system, available by pressing the F1 func-

such as the first few characters of the copy and deleted text buffers is also available. You get two kinds of learning assis-

tance. The first is an excellent on-line help

tion key. If you want more specific information, you press F1 again for full-screen help. Related topics are displayed at the bottom of the help windows.

The second aid in learning the program is supplied by the five different confidence levels. Confidence levels allow you to begin with the more-basic commands and progressively perform more-sophisticated tasks by increasing the level.

Features abound in Smart. Besides spell checking, windowing, and footnoting, the program has a learn mode for macro creation and, when you're ready, a programming language for more-sophisticated applications.

A few minor improvements are in order, however. For example, it would be nice to define various text layouts, save them as style sheets, and then be able to reuse them as needed throughout the document. With Smart, you must set up the layout each time you want to use it in a different section of existing text.

The Smart Word Processor is a sleeper; its features rival those of the best standalone word processors. With the Smart Software System's excellent performance on a LAN (it was a PC Magazine's Editor's Choice among integrated programs for LANs; see "Making Connections: Integrated Multifunction Programs for LANs" in the November 24, 1987, issue). the Smart Word Processor should answer the needs of both large and small offices that need a top-quality professional word processor.—Charles Weinberg

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Symphony

When first released, Lotus's Symphony was heralded as the logical extension of the company's hit spreadsheet program, Lotus 1-2-3. It took the familiar "spreadsheet," or "rows-and-columns," metaphor and added database, word processing, and communications features.

With a current list price of \$695, Symphony has now gone through two relatively minor revisions, but the major shortcomings remain. Although the competition has grown stronger in the meantime, the word processor remains one of the weaker links in Symphony's

Lotus has addressed these problems in a

major revision. Symphony 2.0, but because only a beta version of the new release was available for review, PC Labs tested Version 1.2. Version 2.0's major improvements are mentioned in this review.

Symphony suffers from its adherence to the spreadsheet metaphor. All its activities take place on a single worksheet, which must be saved as a single file. Consequently, it is difficult to pull up one document while editing another. This also means that if you are creating a spreadsheet as well as a database and a word processing document in a single file, you run the risk of altering one region of the worksheet while working in another (for example, by inserting or deleting rows or columns).

MACRO LIBRARY The only items that can routinely be stored in a separate file are macros, thanks to the Macro Library Manager feature. This facility lets you store macros in separate files that you can use with more than one worksheet. And having full access to the powerful Lotus macro command language, you can create some

Symphony's underlying spreadsheet concept has both strengths and limitations.

impressive custom procedures, given the time and talent.

Symphony's word processor does not offer features that we have come to expect from a professional-quality program, such as footnotes, a thesaurus, or proportional font support. The paragraphs do not always reformat automatically, even when the worksheet is set for automatic rejustification. There is a spelling checker available, but it is an extra-cost option.

In contrast, Symphony 2.0 is designed to automatically reformat text as it is being edited. The spelling checker is included as a standard feature of the package, as are an outliner, automatic reformatting, and more-powerful search-and-replace fea-

You simply copy the seven distribution disks to your hard disk (or make backup copies if you are going to run on floppy disk drives) to install Symphony. A menudriven install program makes short work of setting the hardware configuration and the many default settings.

To start the program, simply insert your only copy of the key disk in drive A; and start the program. "Key disk?" you may exclaim! Yes, Virginia, Symphony is still copy protected, although you can use the



CIRCLE 204 ON READER SERVICE CARD

LearnWordPerfect.

Expert Advisor: WordPerfect** is an invaluable encyclopedic reference for all WordPerfect commands, with numerous practical examples. Our expert advisor, Eric Alderman, is the director of Whole Earth

Access Computer Training in Berkeley, California. In his book, he includes every tip. rick, and caution he's collected over years

of using and teaching WordPerfect. This is the guide you want at your side. Available wherever computer books are sold. Suggested retail price: \$17.95.

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included COPYHARD utility to install a loadable version on your hard disk.

Once in Symphony, the screen presents a familiar spreadsheet view. You must change the current window (or create a new window) so that you are working on a document screen. This places a ruler line across the top of the worksheet frame, and the cell location prompt is replaced with a Line Char Cell prompt. The line and character counter make sense (though they don't indicate page breaks), but the cell location may seem a tad incongruous. The reason it is there is that you are in fact typing on a spreadsheet and the text is placed over specific cell locations; it is the user interface alone that is different.

SPREADSHEET CONCEPT Symphony's underlying spreadsheet concept has both strengths and limitations. The strengths come from the fact that you can link portions of your document to spreadsheet cells; hence calculations can appear automatically in your text. This could be handy for creating repetitive bids or financial summaries.

The limitations arise when you try to enter embedded printer commands. You can insert Escape command sequences only by entering the spreadsheet mode, creating a label with a special label prefix (1 1), and then entering the printer initialization string. You then cannot enter any-

thing else on that line of the document. In short, it can be accomplished, but it is neither easy nor intuitive.

The program also furnishes limited control over page formatting, with fixed top and bottom margins for the entire document. The headers and footers contain only one line each, and their positions are predefined by the top and bottom margins. Left and right margins and tab settings are more flexible: you may insert new rulers in the text to change these settings within a document

Symphony is too powerful and expensive to appeal only to personal word processor users, yet it hardly qualifies as a professional-level tool. If you are a 1-2-3 fan and plan to spend the majority of your time working with the spreadsheet portion of the product, limiting your use of the word processor to an occasional letter or report, then you may be satisfied with Symphony. In cases where you need a strong word processor to accompany the other features of an integrated package. you may do better with another package.-Alfred Poor

TeleWriter II

Like optimists and pessimists who argue whether the cup is half full or half empty. TeleWriter II users can debate whether it is a communications program with word processing or a word processor with communications. According to R & S Micro Services, the \$129 package is primarily a communications program. After testing it, though, I'm joining the word processing side.

TeleWriter II. released in January 1987, can search for text, perform a search and replace, cut and paste, center, and insert text. It can delete by line, paragraph, page, or document. You can move the cursor by character, line, paragraph, or page, and to the beginning or end of the current line, paragraph, or document.

Unfortunately, TeleWriter II is unable to move the cursor by word, though you can use the Tab key or Shift-Tab key combination to move quickly through a line. It also lacks a convenient way to delete less than one line of text. Your only choice is the Backspace key, which can be a tiresome alternative.

Another limitation is that search and replace is always global. You can't limit the search, escape from it once it starts, or turn off confirmation.

TeleWriter II offers two editing features that you normally wouldn't find in a personal word processor. First, it can edit two documents simultaneously-and you can choose between splitting the screen vertically or using full-screen windows. Second, it lets you edit columns in full WYSIWYG format.

COLUMN CHAMP TeleWriter's approach to dealing with columns could be a model for the industry. To create columns, you put the cursor on the line where you want the column to start and in the character position where you want the left edge of the column, then enter a one-key command. TeleWriter II visually defines the column with a vertical line

TeleWriter II can create as many columns as you like, at any width. Text within each column is completely separate from the other columns. To move from one column to the next, you simply press the Tab key.

OTHER FEATURES. Two noteworthy features of TeleWriter II are its calculation and sorting. The built-in four-function calculator automatically adds up columns of numbers in your text. However, it gives





R & S Micro Services 2500 39th Ave. NE Minneapolis, MN 55421 (800) 328-6400

Requires: 192K RAM, one disk drive, DOS

2.0 or beer In Short: TeleWriter II integrates word processing and communications to let you save text directly to the word processor or type a

message and send it over the phone. The combination makes it a good choice for those who transfer text from the keyboard. Not copy protected. CRCLE 647 ON READER SERVICE CAR



Symphony, Version 1.2 Lotus Development Corp. 55 Cambridge Pkwy Cambridge, MA 02142 (800) 345-5414 (617) 577-8500

List Price: \$695 Requires: 384K RAM, one disk drive, DOS

In Short: This program adds word processing, database, and communications feat to the familiar "rows and columns" of 1-2-3 Many features one would expect from a professional-quality word processor are m ing, but these shortcomings will be addressed by Version 2.0. Copy protected. MACNIFICACER SERVICE CARC

the wrong answer if the numbers have commas. This function is more useful as a pop-up calculator. Bring up the feature with two keystrokes, type in the calculation, and press Return. TeleWriter calculates the answer and puts it in your document at the cursor position.

To use the sort feature, place the cursor on the first entry on a list and give a two-keystroke command to sort in ascending or descending order. *TeleWriter II* then sorts every line from the cursor down to the next blank line.

Formatting features are minimal. There is no margin setting as such; instead, the program lets you set the line length and printer offset. Alternatively, you can the column feature to define margins. The only ways to set top margins are by adding bank lines to each page manually or by adjusting the paper in the printer. The bottom margin is whatever is left over at the bottom of the page. You have to add headers and footers to each page manually

Printer support is limited. The program comes with a generic driver and minimal drivers for specific C. Itoh, DEC, Diablo, Epson, NEC, Okidata, and Qume printers. However, the only print enhancement built into the program is for italize so nd on matrix printers. If you want more enhancements, you have to modify the driver, ou have to modify the driver.

TeleWriter IP's communications features are worth their own review. The program's overall capabilities place it somewhere between PC-Talkst and ProComm. Features include auto-dialing, auto-logon, unattended auto-answer, and file transfer with your choice of X modem, Xmodem CRC, and X modem batch protocols.

GOOD INTEGRATION TeleWitter II really shines in its combination of communications with word processing. With a document on-serven, you can first jump to the communications feature with two keystrokes and then either pick a number to auto-dial or enter one from the keysboard. TeleWirter II will dial and send you to the terminal screen, where any incoming or ougoing ext is thrown away. When you coughing ket is thrown away. When you want to be a serven when the contract of the communication of the communication

ument, where you can access the full edit-

ing features of the word processor.

This tight integration of communications and word processing makes the communications functions a little confusing.

Once you learn them, though, you can do

munications functions a little confusing. Once you learn them, though, you can do things like capture an e-mail message to document window A, jump to window B to write an answer, and send it instantly to your e-mail system.

If all you want is a word processor for occasional memos—one that is easy to learn and use—there are other choices available. However, if you can make use of TeleWriter II's multicolumn or multiple-document features, learning the program is well worth it. And if you great is well worth it. And if you give a constraint of functionality for text-based communications that you won't find elsewhere.—M. David Stone

WordCAD

IAM's \$99 WordCAD, Version 2.1, integrates business graphics capabilities with text. WordEDT offers several advanced word processing functions in an otherwise rather primitive package.

WordEDIT operates through a series of horizontal text windows that are separated by single status lines. There is also a command line at the top of the screen. When you start the program, you can open with only a single blank window for text, or you

FILE

FACT

can have a simple text help screen also in view. You can immediately begin typing in the blank window, or you can read in any ASCII file. WordEDIT had no trouble importing PC Labs' SOK test file.

Business Busics has chosen to follow for Stark by MoralStar keyboard protocols. For example, to begin and end a block, you type for the property of the proper

SOPHISTICATED WINDOWS While getting around a file is a bit awkward, the windowing function is more sophisticated. WordEDIT gives you the option of opening as many as eight horizontal windows. and you toggle among them sequentially using the F3 key. Each window can hold either a separate document or different parts of the same file. If you want the changes in one window to be reflected in another, you can easily link the two windows. Unfortunately, closing a window is the only way you can stop working with a file without leaving the program. This means that if you want to remove a file from the working area, you must have at least one other window open. According to the company, this drawback has been eliminated in the next version by a New Window function, which wipes the screen clean and brings up an empty text window.

Other basic functions work reasonably well. Once you have marked the beginning and end of a text block, you can delete, move, or copy it, either within a file or between files. You can also save the block to

a separate file

WordEDIT's printing function leaves the most to be desired. Its sequential menu gives you only two choices of printer: 9- or 24-pin dot matrix. It does let you select page length, type quality, spacing, page numbering (printed only at bottom center), and whether to include WordCAD graphics files. But the properam has no provi-



sions for such exotica as running headers or footers, and there is no way to cancel an erroneous menu command.

eronecous menu commans. WordEDT interacts with the Word-CAD graphics program by picking to primary ages from that program and picking them within the primed text. It is relatively easy to insteat an image: at the appropriate place in your text, you type in two braces (graphics file. WordEDT also has its own graphics file. WordEDT also has its own graphics may be a file of the program of the relevant graphics may be a file of the program of the picking the interaction of the picking of the picking of the picking of the limited straight-line drawings, useful limited straight-line drawings, useful

mostly for putting boxes around text.

Purchasers of WordCAD are encouraged to join a user group, which entitles them to a newsletter and monthly program updates for a fee of \$30 for 6 months.

Obviously, WordEDIT leaves much to be desired. It is not as slick as other similarly priced programs, and its general functionality needs improvement (for example, an easy method of canceling incorrect commands would be very welcome). However, as an adjunct to a graphics program, it shows promise.

—Barhara Kraynoff

WordPerfect Executive

When software comes in a gray, pinstriped box, you know the intended market right away. WordPerfect Executive is designed specifically for traveling businesspeople who use laptop computers.

Available from WordPerfect Corp. for \$249, WordPerfect Executive is an integrated program with most of the note-taking, record-keeping, number-crunching, and word-processing functions that the portable pin-striper calls for, the only missing components are telecommunications

and a list of good restaurants.

The program is a junior version of WordPerfect, currently one of the hottest





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word-processing programs on the market. Text files created in WordPerfect Executive are compatible with the senior program, allowing you to take or send documents back to the office for further formatting or work. Word processing is the predominant module in the program. While the other modules work separately, it's easy to pull information from them directly into the word processor, either through macros or through the clipboard.

Included are a program menu called the Shell, an appointment calendar, a calculator, a notecard function, a phone directory, a spreadsheet, and the word processor.

INSTALLATION Installation instructions are included for working with hard disks, two floppy disk drives, or one disk drive. A machine with two 720K drives can access all the program's modules using two disks—a Program's modules using two disks—a Program disk in drive A: and a Files disk in drive B:, which has a few WordPerfect Executive files but leaves over 600K of storage space. A computer with 360K drives must use three diskettes, which means disk swapping for some

One of the fanciest WordPerfect Executive features is its macro capability.

functions, such as the spelling checker.
Installation consists of inserting the
Program disk in drive A: and typing "in-

stall"; everything else is either done for you or prompted on the screen. Three slim volumes of documentation come with the program: Setup, Learning. and Reference. The Learning volume includes 16 lessons that cover the major program functions.

The Reference volume is an alphabetical listing of all WorldFrefte Everifier for a listing of all WorldFrefte Everifier furtices and features. The book is small neough to take along while traveliers to answer most questions. The programs comes with keyboard temphates for the To-table 1100 Piles, the Toshiba 3100 Piles that the Standard and Enhanced IBM keyboards. Without the template, you have to remember to press 73 twice to see a display of function keys.

The word processing screen and function-levy assignments are similar to those of WordPerfect. The main word-processing screen is empty, except for a sparse status line in the lower-right-hand corner that indicates page, line, and column positions. You can establish multiple page formats in one document, with as many changes in

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margins, spacing, and tab settings as you need. A Reveal Codes command displays normally invisible formatting commands. One of the fanciest WordPerfect Execufeature works the same way as that of the parent program: you first name the macro, next have it record your keystrokes until you've finished the desired task, and then save it. Macros work across program mod-

ules, and several of the included prewritten macros facilitate the transport of information from each of the other programs.

The program also does merging-you can set up form letters or reports and merge from phone listings and notecards. Primary files, created from the word processor. call the major fields from the other modules. This is not a full-fledged merge facility with conditional language and other fancy features.

IMPORTS TEXT, WORKSHEETS WordPerfect Executive directly imports and exports DOS text files in the word processor module and 1-2-3 worksheets in the spreadsheet module. It also includes a correction-prompting spelling checker. When the program is running, it's easy to jump between modules without losing the contents of the current module. The functional modules remain in memory to speed

switching between them, performed with an Alt-key combination. The program automatically updates the appointment list, notecard file, and phone directory. Changes are saved whenever you exit by command.

WordPerfect Executive's major limitation is its lack of a telecommunications module. Increasing numbers of business travelers find it essential to remain in contact through electronic mail, to access online services, and to transfer files from remote sites. Although the setup manual lets you install your favorite communications

package, that's not enough. The word processing program's limitation is its lack of fancy formatting controls. You cannot specify fonts, use snaking or side-by-side columns, or write footnotes. There are also no thesaurus, automatic outlining, sorting, or math capabilities directly in the word processing module. WordPerfect Executive is best suited

those who use WordPerfect at home for further document manipulation or formatting. This practical program is lean where it should be, strong in the most-needed functions, and smart with its macros. You can keep your bloated integrated programs-with too many disks, heavy documentation, steep learning curves, and frivolous functions-at home. Take this one on the road.-Bruce Brown

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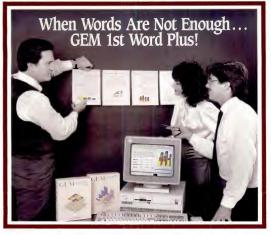
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PRODUCTIVITY

■ PC LAB NOTES: LASER PRINTERS ■ CRAIG L. STARK

Handling fonts IN YOUR LASERJET II

If your laser printer's own fonts aren't enough for your work, here are some tips on tried and proved methods for handling your everyday office needs.

The first two parts of this PC Lab Notes explained how many of the Escape sequences of HP's Programming Control Language (PCL) can be used to control the output of the LaserJet series II and its compatibles. To simplify the explanation and examples, the PCL Escape codes have been illustrated in the form of short, separate DOS files. Except to create special images (such as a company logo), this is not the way most readers will actually use PCL commands. In the typical office the Programming Control Language must be integrated with actual word processing (and some other) software to manipulate fonts and their attributes

Having helped a number of PC staffers get accrete IIs up and running in our production stream, I decided to insert a kind of "nuts and bolts" section on the way we here at PC Magazine use the machine. While no two office needs are identical, a full-scale working model is a good place to start.

THE FONT FACTORY. The built-in type faces of the Laszelet III—Courier, Courier Bold, and Compressed Line Print-er- are of limited usefulness, notwin-standing the fact that they are provided in both portrait and landscape modes and in a wide vartey of symbol see. For one thing, they in all monospace forst. Except for we use a monospace forst to simulate the character spacing on your screen—we print in proportionally spaced type, where MY stake up more space than 1's.

At the copy-editing stage we may not need to see every line break on the syllable where it appears in the printer's galley proof, but we do need to see where some lines will break. (Lines that contain sub-

PRODUCTIVITY INDEX

PC LAR NOTES

Commercial packages to generate and download fonts to laser printers. UTILITIES ASPRN processes macros to imbed laser printer escape codes in text. ENVIRONMENTS Using screen groups, processes, and threads to multitusk in OS2. POWER PROGRAMMING The C function scanf converts input into almost any number formal. SPREADMIEST CLINIC.

SPREADSHEET CLINIC
Macro suspension and a keystrokerecording "learn" mode for 1-2-3.
USER-TO-USER
EGA 43-line patches for MORE.COM
and EDLIN; printing CARDFILE.
POWER USER

Cursor turnoffs for dBASE and Clipper, cleaning up ASCII text. LANGUAGES Snow removal on the CGA; a Turbo

Basic check for a file's existence. PC TUTOR An improved disk-head parker that preserves tracks and sectors.

CONNECTIVITY CLINIC
Controlling the AUTOEXEC BAT
and the active copies of a program.

heads are one example, and the lines that appear as large-lype callous in the middle of a column are unother.) For these purposes "in a verage of 40 characters per line" just isn't good enough: our manuscrip preparation must use type whose individual character widths match those of the typesetter, even when we mix type sizes on the same line. That 5 one reason for our using XyWrite III Plas in our production process.

The second problem with the Laserlet's bitli-in fronts is that they are provided only in 12-point (10-pitch) size for the two Courier typefaces, and in 8.5-point (16-pitch) for the Line Printer. A 12-point type is just the right size for copy editing, but if we used it for our printed body copy, PC Magazine would look like a Dick and Jane reader and be as thick as a New York tel-phone book.

In considering the fonts you need, then, bear in mind that you may need different sizes for draft use from what you'll use for the final product. And if you are getting into desktop publishing, you'll even need different character (symbol) sets for the same font, PageMaker and Ventura Publisher use different character sets, neither of which coincides with HP's favored Roman-8 character set. And none of the three matches the IBM PC-8 symbol set that your screen displays. Indeed, with Page-Maker and Ventura you need not only printer fonts, but separate screen fonts, as well. (Yes, I have six different fonts of Times Roman 10-point, six more of Times Roman 10-point Italic, another six of Times Roman Bold; and the same goes for

PC LAB NOTES

Times Roman 12-point, etc.)

At this point, the number of different fonts you "need" seems to be growing without limit. Whether you've been considering buying plug-in font cartridges or disk-based "downloadable" fonts, the office controller is likely to exert a controlling interest. One oft-tried solution to the problem of restraining font proliferation is to use a font editor to add an 11-14-degree slant to all characters in an upright font. thus creating "italics." A similar attempt can be made with most font editors to "scale" an existing font up or down by a couple of point sizes. Unfortunately, unless your needs are uncritical or your patience in doing character-by-character touch-up editing is positively monastic, you should forget this expedient.

Thus, if you need fonts in a wide variety of sizes and symbol sets, my advice is to generate those fonts yourself, using what are called "font outlines." A font outline is a single generic typeface file. When you run it through appropriate "installation" (font-generating) software, you can create a font of that typeface in any practicable size and symbol set

The font outlines in Bitstream's Fontware Library are the best-known products of this type, and they are currently available for some 20 type families. They are normally supplied as two-disk sets (\$195/set) that contain the needed font outline files for four versions-the roman (upright), italic, bold, and bold italic-of the typeface.

I've generated dozens upon dozens of fonts from Fontware Library packages and have yet to be disappointed by their quality. Indeed, they're the only way you can get odd sizes, such as the 9-point Palatino we use for the DOS-manual-lookalike pages you see in our Utilities column. Bitstream fonts are the same ones you get in already-generated form from HP, are widely (though not exclusively) used in the printing industry, and are used in our Tegra galley-generating machine. At least for our office purposes, then, alternative font outline packages (e.g., from Compugraphic or SWFTE International) were never in the running.

"fontware installation" programs that actually generate the fonts from the Fontware Library packages. Why consider SoftCraft? For one thing, Bitstream's Fontware Installation kit (\$95) limits you either to the symbol sets used by Page-Maker (i.e., Windows) or to those of Ventura. The SoftCraft Fontware Installation Program (SFIP) uses the same Bitstream font outlines and also costs \$95, but it lets you choose among 19 different character sets. These include not only both those of PageMaker and Windows, but also the full PC character set (which we want). With

Both Bitstream and SoftCraft offer

 If you need fonts in a wide variety of sizes and symbol sets, my advice is to generate those fonts yourself, using what are called "font outlines."

the SoftCraft program you can even customize your symbol sets from among the 560 available Bitstream characters built into the font outline file.

The Bitstream font-generating programs simultaneously make the screendisplay fonts for PageMaker or Ventura. On the other hand, if you're into desktop publishing, SoftCraft's SFIP will automatically call its companion (but purchased separately, for \$95) WYSIfonts! program to make the screen fonts for either publishing package, so it's just as easy to use. SFIP lets you make fonts larger than 72 points (it ranges from 3 to 120 points), and it will run on my PC-XT with an Orchid Turbo-EGA. While the first four beta versions of the Bitstream Fontware Installation Kit worked on my machine, the final release requires an "AT or 100 percent compatible." On the other hand, if you need to generate PostScript files, the Bitstream Ventura package is the only way to 20.

DOWNLOADING FONTS Once you have your soft fonts, the next step is to load them into the printer. There are a number of utility programs-from VS Software. SoftCraft, Polaris, The Human Touch Software, SWFTE, and others (including several on bulletin boards)-that ease this procedure. Among those I've tried, my choice is the one in the VS Laser Word Processor Tool Kit, since it makes it easy to download everything daily in one fell SWOOD.

You can download fonts without a commercial utility, though the three-step procedure is a bit cumbersome. First, you

```
110 'Soft-font dowloading program'
128 DEVICES-"LPT1:"
130 CLS:LPRINT CHR$(27);"E";
                              'Reset printer
```

12/97 140 PRINT "Soft font downloading utility" 150 PRINT "Enter a 0 for the font number when through downloading."

160 INPUT "Font number: ".TEMPS

178 FTNUK-VAL (TEMP\$) 180 IF FTNUM-0 THEN SYSTEM

100 'C.E.L. Stork

198 INPUT "Font filename: ",FTNAMES 200 PRINT "Is the font to be temporary or permanent (T/P): "; 216 INPUT FTSTATS

220 IF FTSTATS="t" THEN FTSTATS="T" 230 IF FTSTATS-"P" THEN FTSTATS-"P"

248 IF ((FTSTAT\$<>"T") AND (FTSTAT\$<>"P")) THEN 288 ELSE PRINT 258 TEMP\$ -- *c"+STR\$ (FTNUM)+"D"

260 LPRINT CHR\$(27); TEMP\$; 'Set Font ID

270 TEMPS="COPY/B "+FTNAMES+" "+DEVICES

288 SHELL TEMP\$ 'Download font

298 IF FTSTATS="P" THEN LPRINT CHRS(27): "*c5F": 'Make permanent 300 PRINT

310 GOTO 160

Figure 1: A BASIC program you can use to download a series of fonts. Make sure your printer is on before you run it.

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GRASP is a simple graphical programming language used to create and run animated graphics, demonstrations, tutorials and presentations, or add visual effects to other programs, GRASP allows images to be captured from other applications, or be created using Pictor, a built-in paint program. GRASP can be called from other programs and you can call other programs from GRASP, GRASP supports IBM PC, XT, AT, PS/2 and compatibles. \$99.00

CONVINCE YOURSELF! CONVINCE S. We'l and draw.

■ PC LAB NOTES

send an Escape sequence that assigns an identifying number to the font for that session. To assign the number 12 to a font you're about to download, you send

Any number from 0 to 32767 may be used, though the LaserJet II will hold only 32 fonts simultaneously-and then only if you buy a supplementary memory card for it. I routinely load 16 fonts (my LaserJet II has an additional IMB memory card to hold them, and it will use up to 16 fonts on one page) in the morning and frequently leave them there all day.

The second step is to COPY the font, by filename, to the printer. Be sure to use the /B option so a Ctrl-Z in the middle of the binary font data doesn't prematurely stop the download. Filename conventions for fonts vary with their manufacturer, but by way of illustration. I could download my

Typical Font Descriptor String

Esc&100 "Orientation" par

Esc(10U Symbol set-in this case, 10U, which is the full PC character

Esc(s0p Spacing—in this case, fixed. Note that this is the first of a series of parameters that all begin with Escis, using the "parameterized" abbreviation

discussed in Part 1 of this series. 12h

Pitch-in this case, 12. Vertical height, in points-in this

Style-in this case, upright (1 would be italic).

Stroke weight-in this case. "medium." (The range is from -7 to +7 for varying degrees of

boldness.) Typeface-in this case, Courier,

An explanation of the various parts of a

typical font descriptor string.

12-point, full PC character set Times Roman regular font with the DOS command COPY/B TR12@RPN.PCP PRN

Third, you assign the just-downloaded

font "permanent" status, if desired (it usually is). By default, the LaserJet II assumes a downloaded font is "temporary"-that means, it will be deleted as soon as the printer sees the Esc E (reset) command. To

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PC LAB NOTES



FACT FILE

CTABLE.COM Available on CompuServe or write to author John R. Thompson 3415 Beachwood Blvd.

Pittsburgh, PA 15217 List Price: Shareware, but \$35 fee is rec-

Requires: 184K RAM, one disk drive. DOS? Lorlster

In Short: Extracts font descriptors and character widths and generates a fragment of a primer definition file that produces font selection Escape sequences and a character width table for XvWrite, Microsoft Word,

and PC-Write. Not copy protected. Font Cantrol Polaris Software

613 W. Valley Pkwy., #323 Escondido, CA 92025 (619) 743-7800 List Pricer 500 Regulres: 256K RAM, two disk drives, DOS 2.0 or later

In Short: A soft-font utility program that downloads up to 48 fonts as well as creates soft-font and cartridge printer drivers for Microsoft Word and WordStor 2000, Not copy protected.

CIPICLE 678 ON HE ADER SERVICE CARD Fantware Installation Kit

Bitstream Inc. Athenaeum House 215 First St Cambridge MA 02142 (800) 522-3668 (617) 497-7517

List Price: 595 Requires: 512K RAM, hard-disk drive. one or more Fonnvare typeface package: either Microsoft Windows (Version 1.03 or later, excluding Version 2.0) or Ventura Publisher (Version 1.1), DOS 3.1 or later

In Short: Font-generation program that produces matching on-screen and printer fonts in sizes ranging from 6 to 72 points.

Not copy protected.

CIRCLE 677 ON HEADER SERVICE CARD

Fontware Library Bitstream Inc. Athenaeum House 215 First St

Cambridge, MA 02142 (800) 522-3668

List Price: \$195 per package, 30 packages gysilshle

(617) 497-7512

Requires: 512K RAM, one disk drive. Fontware Installation Kit. either Microsoft Windows (Version 1.03 or later, excluding Version 2.0) or Ventara Publisher (Version

1.D. DOS 3.1 or later. In Short: Font outlines that work with the Fontware Installation Kit. Available packages include versions of Times Roman and Helyetica, Century Schoolbook, ITC Souvenir, ITC Galliard, and many others. Not copy protected.

CIPICLE 676 ON READER SERVICE CARD

SWFTE International Ltd. P.O. Box 5773 Wilmington, DE 19808 (302) 733-0956

List Price: \$99.95 (includes four glyphs or four outlines): \$99.95 for Ghahix Basics package with four typefaces. Requires: 64K RAM, one disk drive.

DOS 2 Our later In Short: A font-generation program that quickly generates and downloads highquality regular fonts and somewhat-lesserquality boldface and italic fonts. Not copy CIRCLE 675 ON READER SERVICE CARD

Laser Fant SoftCraft Inc. 16 N. Carroll St., #500 Madison, WI 53703 (800) 351-0500 (608) 257-3300 List Price: \$180 Requires: 256K RAM, two disk drives. DOS 2 Oor later In Short: A selection of 36 Bitstream-de-

signed Times Roman, Helyetica, and Courier downloadable fonts, with two Soft-Craft-designed decorative display fonts The package also includes utilities for downloading the fonts and creating printer drivers for Microsoft Word, WordPerfect, and WordStar 2000. Not copy protected. CIPICLE 674 ON READER SERVICE CARD

Laser Word Processor Tool Kit VS Software P.O. Box 6158 Little Rock, AR 72216 (501) 376-2083 List Price: \$150 (free with purchase of any font package).

Regulres: 256K RAM, two disk drives, DOS 2.1 or later.

In Short: A set of handy utilities that can download soft fonts, create printer drivers. for Microsoft Word and WordPerfect, and convert fonts from portrait to land-cape orientation. Not copy protected.

SoftCraft Fant Editor SoftCraft Inc. 16 N. Carroll St., #500 Madison, WI 53703

0800x 351-0500 (608) 257-3300 List Price: \$250 Requires: 450K RAM; two disk drives; Hercules, EGA, CGA, or compatible graphics card; DOS 2.0 or later

In Short: High-resolution graphics editor for creating characters and fonts that lets you zoom in on the pixels. Works with SoftCraft fonts, HP portrait and landscape, PC'X and Microsoft TIFF file standards. Not copy protected.

SaftCraft Fantware Installation Program SoftCroft Inc. 16 N. Carroll St., #500 Madison, WI 53703

(800) 351-0500 (608) 257-3300 List Price: \$95 Requires: 512K RAM, hard disk drive. one or more SoftCraft Typefoundry Series Outline Parkages, DOS 3.1 or later. In Short: A licensed version of Bitstream's Fortware, the program creates bit-mapped soft fonts from a SoftCraft Typefoundry Series Outline Package, Not copy protected.

CIRCLE 421 ON READER SERVICE CARD SaftCraft Publishers Solution

SoftCraft Inc. 16 N. Carroll St., #500 Madison, WI 53703 (800) 351-0500 (608) 257-3300 List Price: \$595 Requires: 512K RAM, two disk drives thard disk recommended), Ventura Publisher or PageMaker, DOS 3.1 or later. In Short: Discounted package of SoftCraft products includes WYSIfonts!, SoftCraft Fontware Installation Program, SoftCraft Font Editor, and Font Effects and typeface outline package. Not copy protected.

The Soft Font Manager, Version 1.4C Human Touch Software 8795 La Riviera Dr., #100 to, CA 95826

(916) 369-1261 List Price: \$69.95 Requires: 256K RAM, one disk drive (hard disk useful), DOS 2.0 or later. In Short: Can download fonts from a enu or create customized "font sets" for WordPerfect or Microsoft Word. Uses natural-sounding, descriptive names for its

fonts. Not copy protected. CIRCLE 600 ON READER SERVICE CARD VS FontGen VS Software P.O. Box 6158 Little Rock, AR 72216 (501) 376-2083 List Prices \$250 Requires: 256K RAM, two disk drives

(hard disk is recommended), DOS 2.0 or In Short: Font editor/generator that easily edits already existing fonts or creates new fonts. Not copy protected. CIPICLE BOR ON READER SERVICE CARD VS Library of Fonts VS Software

P.O. Box 6158 Little Rock, AR 72216 (501) 376-2083 List Price: Ranges from \$39.95 for a sinle-size typeface in several styles, to \$179.95 for a complete fora family Requires: 256K RAM, two disk drives. DOS 2 Oor later

In Short: Disk-based ford definitions that can be downloaded into supported printers. VS Library includes 36 typeface families. Not copy protected.

CIRCLE 667 ON READER SERVICE CAR:

WYSIfonts! SoftCraft Inc. 16 N. Carroll St., #500 Madison, WI 53703 (800) 351-0500 (608) 257-3300 List Price: \$95 Requires; 512K RAM; hard disk drive;

IBM, EGA, or compatible graphics card. either Ventura Publisher (Version 1.1 or later) or PageMaker (Version 1.0 or later); Microsoft Windows with HP PCL printer driver; DOS 3.0 or later. In Short: Fully automates font installation.

Not copy protected.

OROLE 888 ON READER SERVICE CARD

make a just-downloaded font session-permanent, you simply send

Esc*c5F

"Permanent" fonts can be deleted en masse with the sequence

ESC*C@F You can designate a specific font and then

delete it by sending Esc(nXEsc*c2F

where n is the identifying number you assigned to the font.

If you haven't got a utility for downloading and the DOS procedure above is just too cumbersome to contemplate for loading a bunch of fonts, the short BASIC program shown in Figure 1 will do the trick. It lets you keep loading fonts one at a time until you assign one of them the ID number 0, at which point it quits and kicks you back into DOS. (If you're curious about line 100, C.E.L. Stark is my son.)

MANIPULATING FONTS Full-featured word processors such as XyWrite III Plus, Microsoft Word, and WordPerfect have "drivers" designed to support the LaserJet II (and other laser printers). When you add fonts you may need to modify these drivers, however, for a word processor does not access the font in the printer by the ID number you give it when downloading. (To do so would restrict everyone to loading exactly the same fonts in the same order.) Instead, software must send the full font selection string to the printer. Then, if the printer finds that string in its memory (that is, if you've previously downloaded that font), it says, in effect, "OK, this is the font I'm supposed to start printing with.

For widely used word processors like Word and WordPerfect, third-party utilities are available that will automatically write new (updated) drivers. Laser Word Processor Tool Kit (\$150, from VS Software; see the accompanying Fact Files) or Laser Fonts from SoftCraft (\$180) will do the iob for you. SoftCraft's SFIP software includes a FONTABLE.EXE program that both deciphers the descriptor string and generates width tables in three different forms, including one ready to incorporate in a XyWrite printer file. The

HPWDT.EXE program in the VS Tool Kit also returns both the font selection string and width table information.

You'll also need this selector string to put into a macro for use by the ASPRN utility (see Utilities in this issue) with other software that does not have full LaserJet drivers. Typically, it looks like

Escal@OEsc(1@UEsc(s@p12h1@v@s@b3T The table "Typical Font Descriptor String" provides a breakdown of the various parts of the Escape sequence.

In theory, if you happen to have HP's Technical Reference Manual for the Laser-Jet series II (and you should, in any case), you can look up all the options, typeface numbers, etc., and figure out what the string must be for a font you've downloaded. But don't count on it. Nor should you try to get it by taking DEBUG to the header of a font file. That task (I've done it) is not unlike the job Ventris faced in deciphering the ancient Cretan Linear B.

In other words, you need a utility that will read the string for you. The closest noncommercial solution is John R. Thompson's CTABLE.COM, a shareware (suggested \$35) program available on CompuServe. It handles HP font files up to about 62K (enough for all but headline fonts) in its current version, and it's eminently easy to use.

EDITING YOUR FONTS Sooner or later you'll be faced with the problem that in Courier a "1" looks like an "1," the 0's should be slashed, and unless you make it rounder, the "(a" sign becomes a blob when photoreduced. The subject of font editing would fill a column in itself, so let me simply suggest here the two products I have used with satisfaction. VS FontGen (\$250) is very easy to use, and SoftCraft Font Editor (\$290), if a little steeper on the learning curve, is considerably more flexible. You won't go wrong with either, and frankly, even if I had to build an entire font from scratch, I wouldn't begin without one or the other. If you're more intrepid, however, Ms. Halliday's conclusion to this series, in the next issue, will show you how to proceed.

Craig L. Stark is senior editor, technical columns at PC Magazine.



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HELP FILE

Volume 7 Number 5 March 15, 1988

Command List for DEBUG Program

Arguments for DEBUG commands: address: (1) Segment register plus offset, e.g., CS:0100: (2) Segment plus offset, e.g., B800:0; (3) offset only, using default segment.

byte: A hexadecimal value in the range 0-FFh.

et/lvs: A 1-byte value indicating drive for reading or writing data: e.g., 0 for A; 1 for B; etc. filespec: Drive, filename, extension.

list: One or more byte or string values.

partaddress: A hexadecimal value representing an 8 or 16-bit port

mory represented as (1) address address (e.g., B800:0 100). The second address must consist of offset only. (2) address L value, where the value is the length of the range starting at that address (e.g., B600:100 L 100). NOTE: If the segment is not specified, it defaults to DS unless otherwise

ime: One of AX, BX, CX, DX, SP, BP, SI, DI, DS, ES, SS,

CS. IP PC+, F (*DOS 2 x only) sector sector: Starting relative sector number followed by the number of sectors to be loaded or written.

string: A string of characters enclosed in quotation marks, e.g., *BM* or *IBM*.

vefoe: A 1-4-character hexadecimal number.

DEBUG Commands

A—Assemble (Assemble directly into memory)

SYNTAX: A jederess |
address = where to assemble: Default CS:0100, Default CS. NOTE: Enter lines of standard 8096/88 assembly language

When done, enter a blank line to return to the DEBUG prompt. C—Compere SYNTAX: C range address

range = range to compare address = where to start comparison. Default DS. EXAMPLE: C CS:100 L0F CS:110 (Compares the 16 bytes start-

ing at CS:100 with the next 16 bytes.) SYNTAX: D leddress

D [range] |address| -- address to display. Defaults to address after pre-

vious D command. N none, defaults to CS:100. Default DS. |renge| = range to display EXAMPLE: D 0 L50 (Dumps 80 bytes of memory starting at

E-Enter (Either replace bytes at address with bytes in list, or

allow sequential editing of bytes starting at address) SYNTAX: E eddress [Wsf] address - where to enter bytes. Default DS |list| = list of bytes to enti-

EXAMPLE: E DS:10 'PC Magazine' 0 (Enters the string 'PC Magazine" followed by a zero.)

F-Fill (Fill a range with a list of bytes) SYNTAX: Frange Hat

range = range to fill
first = bytes to fill with
EXAMPLE: F B800:0 LFAO 'X' 07 (Fills the color video RAM with white-on-black "X" characters.)

SYNTAX: 6 [= address] jaddress jaddress . . .]]
[= address] = if specified, execution begins at CS:address
[address jaddress . . .]] = breakpoints (up to ten) EXAMPLE: Q = 200 240 (Runs program starting at CS:200.

The DEBUG program can examine or change data in memory or on disk. You can also use it to run programs in debugging mode, executing one instruction at a time and viewing the results

H-Hexedecimel Arithmetic (Show sum and difference of

SYNTAX: H vales value EXAMPLE: H ABC 123 (Yields "OBDF 0999") I-Input (Read and display one byte from port)

SYMTAY | aprinderess L—Load (Load disk sectors into memory) SYNTAX: Laddress drive sector sector

nss = where to load. Default CS. EXAMPLE: L DS:0051 (Loads first directory sector of drive A:.)

L-Load (Load file; use Name to specify file) SYNTAX: L [address] address = where to load. Default CS:0100.

M -- Move (Copy bytes of range to address) range - range to copy FROM address = address to copy TO EXAMPLE: M B000:0 1DF B000:A0 (Copies the first three lines

of the monochrome video RAM down one line.) H-Neme (Change current filename)

SYNTAX:N [d:][path]//lename[.ex/ ld: Kpathinienamel.ext) = name of file to load

O-Output (Send a byle to a port) SYNTAX: B partaderess byte P-Procood (Like Trace, but executes e call, loop, interrupt, or

repeated string instruction as one instruction) SYNTAX: P | - address| [value] [-address] - where to begin tracing. Default CS:IP.

Ivaluel - no. of instructions to Proces Q-Quit (Quit DEBUG: doesn't save file)

R—Registers (Display all registers, or display and modify one) SYNTAX: R [registernome] SYNTAX: R [registerneme]
EXAMPLE: RCX (Displays and edits value of CX.)

S_Seerch SYNTAX: S reege list

range = range to search list = bytes to search for EXAMPLE: S CS:100 L100 'Benena' (Searches the first 256 bytes of a program for the word "Banane")

T-Trece SYNTAX: T] = address[[value] [- address] - where to begin tracing. Default CS:IP. [value] = no. of instructions to Trace EXAMPLE: T = 102 3 (Traces three instructions starting at

CS:102.1 U-Uneccemble SYRTAX: U [oddress]

ess] -- where to begin Unassemble. Defaults to addr after previous U command. If none, defaults to

CS:0100. Default CS [renge] = range to Unassemble. Default CS. EXAMPLE: U CS: 100 (Unassembles starting at beginning of

program.) W-Write (Write to disk sectors)

SYNTAX: W eddress drive sector sector address = where to write from, Default CS. EXAMPLE: W DS:0051 (Writes first directory sector of

W.—Write (Write the data being debugged to file) SYNTAX: W [address] address - where to write from. Default CS BX:CX = number of bytes to write



Universal Printer Stand Save Space, Save Money...Only '24"

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ASPRN CURES LASER PRINTER HEADACHES



Sending long Escape sequences to control laser printers is a pain at best and impossible for many word processors. This macro processor inserts the codes right in printer output.

Printers are a wonderful, often mysteence, but none are more wonderful and mysterious than the laser variety. Couled with a laser-aware word processor, a laser printer can produce page after page of teter quality output, making even the simplest notes and memos more attractive. A laser printer, however, requires a

large investment, and chances are that you will call it into service both as an intelligent peripheral for your word processor and as a simple draft printer. Even simple tasks can stand some enhancement. Assembly listings, for example, look great using the line printer font printed 13z columns wide across the long dimension of the page. And often I'd like to dash off a note using

my Times Roman font without the bother of firing up WordPerfect.

I know that in theory you can do this simply by sending some codes to the priner. Ever the practical man, however, I took one look at the programming manual for my laser, filled with page after page of repite Escape codes, and then declore and by metally preferred [10-pitch Courier type in portain mode. As a menument to creative lazines, I wrote ASPRN, a utility that less you spend more of your time potting information on paper, and less time worrying about how it gets three.

MACROS FOR YOUR PRINTER ASPRN is a printer-output macro expander that works somewhat like a keyboard

macro processor in that it lets you substitue a simple keystroke for a complex quence. For example, to dash off a simple one-page meno, you might ordinary have to enter a complicated control string have to enter a complicated control string to turn bold on, another to switch and the styles, and yet another to get back to norall. Even if you could memorize all those control strings and you could enter the necessary escape codes directly in the regarm you've used to create your file, such a keypecking procedure is just too much

Imagine instead being able to enter "B to tum on bold., "I to tum on italics, and "N to return to normal. Sound better? Well, that's exactly how ASPRN operates. But rather than sending these codes to your

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s and look	it to e se	acape asquence of tup atrine. Cier	rtility. a TWO that watches TWT 17 f the form [char]s where m=(s-1) and new itself to include changes in rectors act like different programs.
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i			

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	EQU EQU	13	(Common equates
LF	EQU	18	
186	100 100		Common equates
1.F 190 095	EQU	18	
1.P 286 361 27667	EQU EQU	18 52s 53e	
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GLD INTI7	046	1.1	ustore oid vector here
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the nesory	. The Le	egth of atrings is h py is writtee to dis	ere so well. These are updated

like work.

UTILITIES

printer immediately like a setup utility, ASPRN lets you embed them in your document where they will be expanded at print time. It lets you specify up to 26 macros-a macro being defined as a user-selected character followed by a single letter. When a document that contains a macro is printed. ASPRN intercepts the two-character combination on its way to the printer and substitutes the long control string assigned to the macro.

Both the assembly language source code (ASPRN.ASM) and a BASIC program that will create ASPRN.COM when you run it (ASPRN.BAS) are printed elsewhere in this article. The easiest way to get a copy of either of them, however, or to get a fully assembled, ready-to-run ASPRN .COM, is to download it from the PC Magazine Interactive Reader Service, See the sidebar "ASPRN by Modem" for the details.

PRESCRIBING ASPRN Though not a large program (it weighs in at just over 2,300 bytes), ASPRN is quite flexible and has a number of unique features. ASPRN is a memory-resident program that sits between your regular programs and your printer and allows you to send control strings of nearly unlimited size almost effortlessly. While designed specifically with laser printers in mind, ASPRN can communicate with any dot matrix or letter quality printer just as effectively.

The program itself is fully configurable. Several useful printer enhancement programs contain a number of simple, predetermined printer control sequences, and if that were all ASPRN allowed, it would be neither exciting nor unique. Instead, each of the 26 possible control strings can be entered, edited, and saved. A string may also be given a clear descriptive name, like Times Roman Bold Italic, to make identification easier. And rather than forcing you (or DOS) to hunt for a senarate file that contains your definitions, when

 Though not a large program, ASPRN is quite flexible and has a number of unique features.

you make updates and changes. ASPRN writes a new version of itself back to disk as a single, self-contained .COM file.

INITIALIZING ASPRN As written, ASPRN contains 26 empty control strings; if you just loaded it, it would simply absorb the macro combinations and perform no useful work. The first step, therefore, is to fill at least one of the empty macro slots with the control string it will represent. If you're reaching for DEBUG, stop! ASPRN comes with a fully functional line editor that lets you enter and modify complicated control sequences and normally nonprinting characters, including the ESC character. The editor is built in and is invoked with the /S command-line switch. Simply enter

ASPRN /S

to load the program in setup mode and bring up the editor. As depicted below in the accompany-

ing diagram "ASPRN Edit Window," the window contains three major areas of interest: the macro character sequence, the descriptive macro name, and the macro string itself. The macro sequence, which is shown on the first line, is the two-character combination that, when sent to the printer, causes the string shown on the third line to be transmitted in its place. As the program is written, the default macro character is the tilde (), but this can easily be changed to a character of your choice. (For the sake of this discussion, I'll stick with using the

The second line is provided to let you give the string a descriptive name. The name may be as long or as short as you like, so you can use this space for comments to help you remember what a sequence you've entered does.

The third line contains the macro or control string itself. This may consist of any combination of characters (excluding the NULL), and it can be of nearly any length. No control string, no matter how arcane or complex, is beyond your reach.

A SAMPLE MACRO Most laser printers don't provide a convenient way to eject a page. If you've just dashed off a small note and want to move to the top of a new page. you usually have to take the printer off-line and press a button or two. Since I keep my printer across the room, this means getting up from the desk and breaking my train of thought (a dangerous venture at my age). Worse yet, the high cost of laser printers forces some people to share a printer that may be in another room. And even if you have a batch file that echoes the form-feed character to the printer, you have to be at the DOS prompt to use it. To help you get

٨	SP	R	N	Edit	Window	

SPRN Edit Window	Leanner
~A	ASPRN 1.0
NAME:	
MACRO:	
STRING: ←→ INS DEL. ↑ ★ MACRO: PgUp PgDn F7=Save	,

When ASPRN is started with the /S switch, macros can be entered and changed using the built-in editor interface shown here.

DRODUCTIVIT

which strip a row, prin	g to een	d to it's place. If two	escepe chare ere cont in		HOV HOV	SI,OFFEET STRINGS SI,OFFEET CUTOFF CX,STRING LEN	nource of strings Destination Number bytes to move
C FLAG SIC FLAG	0.0		;=1 if lost was Esc-char ;Non-ears in emergencies		MOV MOV	SIMING FOCISI'ES	Hew engment of strings
217	PROC	PAR			MOV ACO	0%,C8	Here length of etringe edd to program length
ASSURE	CRICER	G,DB:ROTHING,ES:EOTE1NG,E CS:FARIC_FLAG,E	:If panic flee		182	HOVER	Move DB:81 to E8:01
	JNE	19717_6	; do nothing		A210 907 ERR	CE, 4	cound to newrest paregra convert to pares by dividing
217_0:	OR JE CLE	AR, AN 1RT17_1	; obsek for Esc_CRAS		909 197	DH, CL AN, 31 FFH 218	:Terminate & etey resident : thru DOS
217_1:	JWP	DMOND PTR CB:OLD_IRT[7	Disable interrupts Else, costiece	Javanes	ENDP		
	CHP JNZ	CO:ESC PLAC.S INT17_F	Nee lest char esc? Tee, go expand	: Rhen termin : reeldent to : er writtee :	de the	r the first time, the I dirty work. Everything the strings.	SERIVEL proc must be left q after curory is discorded
	JWE	AL,CB:EBC_CHAR INTIT_B	; Te this so set_char ; No, just print it	curtory	EOZ	1	
717_1A1	INC	CB:EBC_FLAG	; else, eet letch				
717_2:	3H2 3H2	NE.2 DETIT_S OS:ESC_FLAG,S		7 The ISITIAL 7 The command	IE proc	edure performs most of itabee, checke for pre-	the work. It interprets vious ceples, and does ell
	JE	AL_CS:Eec_CHAR 18717_6	if escord esc char portput single char	the memory i	D.B. DB	"Rot Residents"	***************************************
	OR SUB CHP ZA	AL.288 AL."+" AL.25 INTI' IA	: Make lower case :Convert to 8-25 :Most be to range ; else ignore	SYNTÄRS	Des	"Deege: ANTEN [/U	ve vec vosse s-
	CALL	EXPAND INTI7 1A	Exact the secre	INITIALIES	ASSURE ASSURE	MEAR CB:CBEO, DB:CBSG, ES	iceto, seiceto
917	THOS.) set up a lo	ral etec	k at the end of the pro	ogran.
					CLI	dp,offeet etacs top	Disable interrupts SelSF points to stack Allow interrepts
Expand the	macro fo	r this etricy combination 5). OX = printer cumber	. Enter with AL + etring		871		(Allow interrepts
PAND PAND	PROC	NYAB	(from original int).	Display the	copyrly	ht notice.	
		G, DE: NOTH DWG, ES: HOTHING, O	H-ROTKING	1	90V 90V	DX, OPPSHT COPYRIGHT	(Say who we are (Displey exting function
	PURM	DS SI CE	iffared used registers		INT	AM,9 218	: Thre Dos
	EDS HOV ADD ESC	SI,DWORD PTH STRING_LOC CL, AL CL, CL	: Point DE:#1 to atrioge Each macro occupies two strings, so double end edd one	Release the	copy of rees of PUSS	the sewironment elloc- the enw block is locat-	ed at offset 2Ch in the FSF.
7,81	OR JE	CL, CL	iff at selected atring copy it to printer :Adjust counter	ALEUNZ	907 907 EE (802	EE, WORD PTR DE([201] EE, BX	Get environment magment in ES
P_1:	DEC LOOKE	cr			960V 1877	AF, 49% 21m	Fyse ellocated memory Thre DOS
	DOSS OR JNE JNE	AL, AL EXP_1 EXP 6	:Flod the etring end :If not termineting were : continue to read etring :Slee find next string		POP	81	(Restore register
P_2:	Lones	EAF_V	idet a char	Apartosis	88 (C11	g .	
	OR JE FUREE	AL,AL EXP_3	(At end of string) (Yee, exit	The CMD_LIN	t proced m bit-pa	ure looks for switches ched in AM.	er the command tail and
	EALL CHP	AM, AM EMORD PTR CB:OLD_IRT17 AM, 165	print the cherector through old int check return status coetlose If no error	/s (setup) loaded	will im	che the editor and all d written out to disk.	ow changes to be made to the No changes are made to the
P_3:	JE POP POP	EXP_2 CX ex	: roetinge if no error :Restere weed registers	1 /8x (Recro	cher) wi If the	if one emiste, il substitute the char /S parameter is specif	x for the default escape (sed, the char will be changed to disk. otherwise, the char peration characteristics, on any char from \$81-255 to upy if possible.
	FOF FOF FET	DIS DIS	shed return	i /cann (esce	d to det	ermine residency and or Same on /E, but allow a a decimal number	operation characteristics, on any char from \$81-255 to
(PAFD	2907			1 /U (Uninste	tee, my	sotten. Other serting	re are agentes.
This is the	emailee	et amount of the program !	that can remain in manory		CALL	IMIA-1 CMD TIME	;Oet awitchee in AR ;If no cerry, no error
MINUR	BQU			2827_01	HOV HOV INT	OK, OFFORT STRTAMS	(Show correct syntax (Displey string fn) Thru 808
					HOV THT	21H AN,4001b 21H) Thru 805)Terminate with error Thru Dod
little man-	reelly t	he past of INITIALISE the	et makes sure we use so stringe downward.	1917_1:	187	218	1 1004 000
RIVEL	PROC	NEAR 10, 05:CSEO, ES:WOTHING, 1	a. watering	Process the			
	CS (CS)	e, esicaso, Esimoralmo, i	B I NOTE LING		7557	AM, C. SW	(Request to unlead?

UTILITIES

28	INIT_2	:No, thick next evitch	CMD 21	HOW	EL, AL	:Put ther count in Bi
CALL	THIT_B	punlose if possible punry set if error	1	38 08	CMD_6	:Any more chars? :If oot, salt
HOV THI	AX, 4000H 21M	:Terwinate pkey		5/09/68 DIDC	BL	Get character in AL Adjust count
TEST	AX, S. EW	pletup switch on?		MOV	CH. WHITE LESS	Fumber to cleck
28 2HP	INIT 3	yWo, check next option yWee, Invoke the editor		JE	OFD_2	plump 1f cher wee who
CALL	PIND_RES	plook for resident copy		CMP	AL.*/* CHD 4	(In the char a sleah)
JC JHP	LOAD REPLACE	(No copy found - try lead ; slee, replace	CHD_EAS.	80V 670	AH, 1290_EW	Signal error Carry on
ENDP			,			
						e en leelegsot feebien.
re vill	cause the load copy :	of the program to become	CRD_41	per	86, 8L	:Switch must fellow '
try vie	Nook the interrupt :	sectors, load the strings,			CHD_EAST	(Set switch
				DEC AND	85 AL,907 288	: Meduce count : Meduce count
CBICBI	ID, DELCHED, BRICERO			CHP	AL. "U"	request to uninotel:
PUSH ES: NOS	ES TRIPS	:Preserve register : Changed by next me:1		CHP	M. 181	:Setup : jump lf /s
HOV INT	AX,3517H 21H	:Get BIDS printer INT :Result to ES:BX		CHP	AL. 787	(Escape char (1980 15 /8
HOV	DLD_18717[#].8X	grave pld vertor		CHP .	A4. 757	rancage Char
POP	**	Mestors register				jump of /C No more level cetion
REICE	AX.2517H	(But new Anterrupt	060_51	200	20.V SW	inet bit
INT	De, DFFEET INTLY 218) to us at DEIDE) Thre DOS	CHD_61	390		(Continue econ
				390	CHO_2	; continue eren
U.795 04	me ell memory from it	FIF to the end of memory.	CHD_T1			
			00_71	31 31	St. St.	Does a cher fellow? Mo. system error
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y memory a low m segment and rel CALL JMC JMP	y an allocation cell; semony block to cental of allocated block, ocate atrings downer FIND LOW LOAD_3 SERIVEL	will find will be below us. n the etrings. If sortess, if no room le foord, distant di	CHO_81	JE LODGE DEC MOV JEP MOV MOV	EL ENC_CRAM, AL CHD_2 CH, 3 ER, 14	; meter error ; meter eacepe char ; meduce perm count : meter in load copy ; continue even ; manter of digite to ; consecut to mittini
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y memory of the control of the contr	ry an allocation call: memory block to contail of allocated block. FIND_LOW LOWD. SERIVEL SE	well find will be bedowns. The winds, if years, The words found, desired The words found, desired The words found, desired The committee the program	00_0	Locale	CHO_TEUR BL ESC_CHAM, AL CHO_TO CS_3 CS_3 BS_1.5 BA_AAA D1_AAA BL_BC CAO_TEUR	100. eyetak arror 100 tow morape char 100 tow morape char 100 tow morape 100 tow
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y memony a low a segment and rel segment and rel segment and rel segment and rel segment y segme	y an miscentum cultures where years to contain service the contain service at the contain s	will find will be naclew use the control of the con	00_0	LOOSE SEC SUB- LOOSE SEC SUB- LOOSE SUB- LOO	COD_EAR EL COD_3 CO, 10 COD_3 COD_1 COD_2 COD_1 COD_2 COD_EAR EL, SC COD_EAR EL EL COD_EAR EL EL EL EL EL EL EL EL EL E	IRM, syntak error Not now scape clar Notice per count Notice per
y memon a negment and rel segment and rel segm	Ty an alsocation call' of allocated back- costs strings devices resolution food food food food food food food fo	will find with the native us. The state of	00_5; 00_5; 0:16;	JI LOOMS SEC MOV JEP JE LOOMS SEC MOV MOV JE LOOMS SEC MOV JE LOOMS SEC MOV JE LOOMS SEC MOV JEP JEP JE LOOMS JEP	CHO_EMR SL CGAM, AL CHOO GR, 1 SR, 16 AL, AL GR, 2 AL AL AL CO_EMR SL SL SL SL SL SL SL SL SL S	IRE, syntak error Out now scape clar Redoce perm count row in lace copy countines eren massher of digits to Observant to multiply of the countines eren out of the countines eren ou
y memon a low a lo	y an alcontant call y an alcontant call of allocated block. conte strains develor rice (and allocated block). If solidated block and allocated and allocated and allocated are solidated are solidate	well find will be naclew us. If the will be naclew us. If to spens I form of the second secon	00_0	LOOSE DEC MOV	COD_EXE EL EL COL, 1 EL, 1 EL, 16 EL, 16 EL, 16 COD_EXE EL, 66 COD_EXE EL, 67 EL, 67 COD_EXE EL, 67 EL EL EL EL EL EL EL EL EL E	ins, systak error just new secupe clar juste secupe clar juste in lade copy jountless seen juste in lade copy jountless seen juste in digits to jountless to myltiply jountless
y memon by memon a low s a low s egment and rel and re	Ty an alsocation call' of allocated back- costs strings devices resolution food food food food food food food fo	will find with the native us. The state of	00_51 00_11 0=_141	JI LOOSE DEC MOV JISP MOV ZOE DEC STREET DEC MOV JISP MOV ZOE DEC STREET DEC MOV JISP MOV JISP EXCEPT MOV JISP	COD_EXE EL EL C(AMA, AL COD_E) BE, AL BE, AL COD_EXE EL AL, '4' A	year area processing of the pr
y memory of a low s and rel call. Jac and rel ca	y an alsocation call, or filescend of the control of filescend block, occat witing downers from Loss States of the control of	well find will be naclew us. If the will be naclew us. If to spens I form of the second secon	OHO_F1 OHO_F1 OHO_F1 OHO_LIFE 1 THE SECOND	JI LOOSE DEC MOV JSSP MOV ZOE ZOE MOV ZOE	COD_EXE SL SC_CAMA_AL OND_1 AL AL AL AL AL AL AL AL AL A	The system error part process of the system
y memory of a low a segment of the control of the c	y an alsocation call. of fillowed block. rose of allowed block. rose of all	with red with the nation of the control of the cont	COC_11 CO	JI LOOMS DEC MOV JISP MOV	COD_EXE BL BLC CAMA, AL COD_EX COD_EX BL, AL BL, AL COD_EX BL, AL COD_EX BL, AL COD_EX COD	The years are proposed from the proposed from th
ly memory a low a segment of the control of the con	y an alsocation call, or filescend of the control of filescend block, occat witing downers from Loss States of the control of	with the same of t	COC_ST CO	JI LOOMS DEC MOV JUST DEC MOV JUST DEC MOV JUST DEC MOV DEC MO	COD_ERR SL SC CAMA, AL OND_1 CAL, 1 AL, AL	int, years are: just now empsy that price are supported and price are supported price
ly memory of a low s segment of the call. CALL. JNC JNP CALL. JNC JNP CALL CALL TNC JNP CALL	Ty an allocation call, y an allocation call, and a control call call call call call call call ca	The control of the co	COC_ST CO	JI LOOMS DEC MOV JUST DEC MOV JUST DEC MOV JUST DEC MOV DEC MO	COD_EXE BL BLC CAMA, AL COD_EX COD_EX BL, AL BL, AL COD_EX BL, AL COD_EX BL, AL COD_EX COD	int, years are: just now empsy that price are supported and price are supported price
	CALL 20 H997 H997 TEST J09 CALL 20 J09 L00 H997 H997 H997 H997 H997 H997 H997 H9	CALL CALLAGE	Column	Col.	1	1

PC MAGAZINE # MARCH 15, 1988

|Clear carry = no error |Load flags |Return

GO_1: SET 12 Senthing is on the line. Let's find out what.

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UTILITIES

ASSURE	CALL EBIROS	FIND_REA RING			AXP	CE, 16 CHIPS	Compare first 16 bytes CMF BG:61 TO E8:01
	ww	GX, GPPENT NOT MESS	(Default error mag		98	CE,CE PIPO RES 1	;All matched; ;No. continue search
	JWC	UNLOAD 1	INC If seccessful, jump Return with carry set			7190_XX8_1	
	RET	-	Return with carry set		CLC		Bet MC = success
				PERO_REG	mere		
A previous o	opy was	found it memory. Now C	S-DS-new copy. ES-SE-old		2,000		
the same on	the set	of the resident copy,	nter loterrupt. If it's then we car deinstall.	,			
6AD 11				f The program	hes bee	n loaded normally, and d strings with the new	is elresty resident.
	PURE	BX .	:Save resident segment	20 - 21 - 1	In section	et	e co. compet
	HOV 187	AX, 3517E 31#	:Oot Current EIOS pro INT :Negelt in BE:EX	BADREPLACES PEMBESLEN	DIE	Cu,LP, "AMPEN Failed.	Duggest Reboot.",CK,LF,"\$"
	100	AX	:Discord offset, retrieve	REPLACE	1800	NEAR	
	HOV	OX.OFFEET CAPT_GOS	Default error message			OG, DEICEBG, ANIESTRING	
	HOV	AI, EI	Est 17 segment to AK (ES)	: If the old	atrias s	arment tes recorded in	ald coost in the same as
	77	UNLOAD 2	, and so resident explicit?	; the resider	t progra	m segment, then they ma	at he chopped off.
	**		1100, 100070		HOV HOV	AX,558 AX,AX 218	Set active PSP to TSE
Another proc	ran hee	intercepted the printe	r and we connot deinstell. mearly disabled.		INT	218	(Vindocumented Dos
Turn on the	panic s	witch so that we'll be	meanly disabled.		HOV CHP	AX, AX:STRING_LOC(2)	; Is old string segment ; same so old prog seg?
LOAD_LA:	POSA	AY			78	REPLACE_S	; same se old prog seg? ;Yes, cut them off.
	POP	**	;Point to resident ; segment sqsin	Innerson			
	HOV STS	ES-PASIC_FLAG, SPFE	segment squin clasble sepander Indicate error	The strings	ere in	s separate block, so we	con just relesse then.
	ART		/Neturn	,	2018	10	; fore 20
			- 41		WOV	ES, AK	rangment to release Free ellocated memory
1. Restore	Int 17h	naded after us. Perfor to its previous value.	- Low g-80781.		INT	AX, 450 218	(Frme ellocated memory (Thru DOS
		that we ellocated to b ferent them atring bloc			POP	E4	(Restore segment
Note that Es	pointe	to the resident sequen	t.		200		
AND_21	Los				2902 2902	REPLACE_2 REPLACE_4	proclimum if no erro
ASSURE	05:1925		ET17 ;Get seved vector ;Changes 56			-	
	HOV	AX, 2517R	Mestore it	strings ere	still e	tteced to the old AFFES	.com file. We must surgue
					. maris	n ten 014 ER Block down	to hold just the program.
	LEE HOV DET	AX, DWORD PTR ESISTED	U LOC jitring sequent in ES Free strings block Relesse seq in ES Frence Af error	REPLACE_11	ww	Ex correct arrange -	OFFEET CARG + 15; ORE 4
	THT 2C	UNLOAD_IA	:Release seg in ES		HOV	AK, 4AK	(Setblock
	-	AX.ES			30	AEPLACE_4	Constitute and
	CHP		;Hove seg tn AX ;If = program segment	,			
	JE	UKLOAD_3) return	; Try to loca	te s blo	ck large enough to cont lower memory;.	eis the etringe below
	907	EU, AX AN, 49E	¡Free res code		(11		
	HOW THE	219	/Pres strings / Thru Don	ASPLACE_2:	CMLL	PIND_LOW REPLACE 1	Look for memory block
LOND 31	JC.	UNILONO_IA	Penic if error		1c	REPLACE_1	jump if set found
/GRD_31	cre		(Clear cerry fleg	Roon was fo			
	FURE	ca	Reset DC and Ec	; Relocate th	e string	new segment was return s. Update the pointers	in the resident copy.
	POP	DE CE) back to CE	1	CMA	NOVE STRINGS	(Copy strings to block
	700 707	CS ES			west	A0,50E	:Set active PSP
					MOV		
OAD	EHO?			REPLACE 2A+	THE	218) Thru Dos
					HOV IST	AX,40990 228	(All done: Terminate.
Search memor	y to se	if a copy of this pro	gram bee sireedy been				
If found, NO	CE .	o if a copy of this pro or copyright motics. OE = AX = LOAD COPF, RE OB = AX = EE = EX = LOAD	- EE - BER COPY	: There is no	room in	low memory, so we want	to relocate our strings
If not Cr	, cs =	28 - AX - EE - SX - LOA	D COPT	; to the low	et possi	ble address. We current	to relocate our strings tly own all high memory. ogh to hold the program,
NES ASSENS	PROC	EEAR D. DE:CORG. ES:FOTRIFG) stringe, er	d STACK.	, , , , , , , , , , , , , ,	program,
AMPUNI		e, oricore, Estrotaino		REPLACE_3:	MOV		that action yes
	CLD		:String movem forward :Modify to svoid false match		HOV	AX, 586 EX, CS	: back to us
	BOT	WORD PTR (ENTPT)			INT	218	j Undocumented DOS
	HOV	AX, 688E AX, CE	AX = our segment AX = our segment		POSE	E6	; Nove register
mo_mmm_1:	rec	ha:	(Next paregraph		MOV	AN, CAN	(Change size of block OFFSET CHEG + 15; SER 4
	HOV	ER, EX	inst 65 to search sequent		HOV	REMBEGLEN, EX	; Seve this size
		AX, EX PIND_REG_2			PURE	CS CS	; set ES to CS
	BET		gales, fley feilure		POP	21E	: 1.e., segment to moda
			1				,
0_820_2+							
10,000,21	MOV	SI,OFFERT ENTRY OI,SI	offeet is same		POP JWC	ES REPLACE_S	(ASPRN.ASM comm

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UTILITIES

MEPGACK_41				1	197	218	(Dadocumented DOS equi)
	MOVE MOVE	DE, OFFRET BADREFLACED AN, 9	(Indicate on -cs.) (Display string		PLESS	50	
	INT	21m	t thee bog		POP	13	Peiet EE to the
	MOV.	BE: PARIC_FLAG, 87FH	(Dissible expanse)		HOW 1HT	AN, GAN BX, NEMIROLEN 21M	Hetblock Same wipe Thru DOS Frank if error
	187	AX, 4CFFR 21H	Thre bos		JC.	REPLACE_4	
					187	AN, 40000 213	Three Dos
Ank for 4-	memory ave	1 get an error and bit with table. One of the lutt	ii contain the lawy m or bod functions returns. f it.	REPLACE	23(3)P		
EFLACE_5:				Look for a s	riace of	nemory large stough to	hold DE-STRING LEN bytes on heling lended.
	9000 9000	AN, 45H SK, 07777H 21H	(Allocate menuty (Ask for 640% (Available returned in 80%		AN, BX,	er	um helng leaded.
	CHP	SK, (OFFSET LANTHETE - REPLACE_4	094ET CD0 + 1'; D8 4	FIND_LOW AMBURE	PHOC CIT I CITY	NEAR G, DE-CHMG, EE-MOTELMG	
	300	AH, 45H	patterner or cutting man		HOV	AN, 488	;Allocate memory
	JC INT	21H REPSACE_4	pair a new awarest		ADD	ME, STRING LEW	:Change length to byte
					HOV MAR	CL, 4 HK, CL	; to perse
Daplicate		um at the new address.	(opy from deces to emids		IFT	218	: to pares : Thru DOS
	208 W09	H1.H1	151 - 9		RET		
	P10016	01,01 Es	DEVE TEN Bright CO	FIND L/M	2409		
	90V	ES, AR CR. OFFSET LASTINITE	(New hlock (Sytem to mov-				
	CLD	MOVER	1000 to new salene-	s delocate the	e etring	m from DE:HTRINGS TO AM meldest copy.	8. Update the pointer
	POP	23	reely to are against	HOVE STHERED	PROC	BEAR	
				AVECUE	PURK	C, DEICEBC, EBINOTHING	/Neve resident segment
How, hop s		new home by using a fer :					
	PUSH POSH	AN DX,OFFERT TARCET DX	:Pat new cd no stack :And address of the ; next instruction		HOW	CX,STRING_LES MS:STRING_LES,CX	:Sytem to move topdate remident copy
	CLI		then off anterspre		XOR HOT	DI,DI MH:BTRING_LOC(#),DI	Copy to offset 0
	08	8CH6	jopcode tor MATE		H077	ENGETRING LOC(2), AN	Now segment Destination to ES:01
	SE ANITAN	GET, in the copy of the p	program. Make of two:	1	MOV	HI, OFFSET STRINGS	Hourse to being
OCCT:	PERM	es .	recoverates him forces and di-	1	CLD	2010	Mitting moves forward
	POP	EP, OFFEET STACK TOP	Change segment and offset		200	***	(Restore segment
	977.3		(Allow interrigits		PET	_	,
	MOV	HE, AM AM, Sele	plet the new PIP	MOAR MAKENER	DIOP		
	INT	AW, 54H 21H	Net active PiP Undocumented Dori	_			
Relesse th		held by the old copy of		This proc a	llows yo	w to edit the strings. de + strings cannot exc om file.	on entry CH-DB-ED. end 648, which is the
	PURN	101	phore register	NEWSWEET.	to.		
	POP	EH EH	:Put loaded PSP mmg : in EN	SAVES OVERMRITES FERRORS	00 00	CR.LF, "Neve changes of CR.LF, "Overwrite enis CH.LF, "File error. To	a Appainent Cont (T/m) 5" ting filet (T/m) 5" y Ageint (T/m) 5"
	INT	AV, 45H 218	Pres memory Thre Dos	VERRORS	000	CH,LF, "WEITE GEFEE. 1	Ty Agein? (T/8) \$*
	PGP	ES METLACE 4	:Restore register :Peace of erios	FILEMANE COM_PTR	DM	"ANTRUMEN. CON", 0 OFFSET STRING_ESD	(Cannot exceed 64k-200
				SON END	00	24 98	Defaulte for rommon video Rightmost column
	PORM	CI CI	Set De to this new set)	COC 444			
	POP	CII DII		VPAGE	000	•	lytelas bade
	POP	C11 100					inspected attribute
	PORM POP the H bloc	CM DO k for the Miringe.		VPAGE	000	•	lytelas bade
	POP	cu to k for the wtrings.		VPAGE	09 09		lytelas bade
	POP POP the H bloc MOV MOV	CH DO LE STREET OF STREET	:Nock mat belong to	OC. MAR VPAGE AFTA	DS PROC CS+CSS	NEAR N, DNICKEG, MHICKEG AN, 44M	selected attribute
BEAKPT:	PORH POP The H bloc HOV HOV INT CALL	CH CO CH SETTINGS. A for the SETTINGS. AW.550	:Mock must belong to : Emaident Copy	OC. MAR VPAGE AFTA	PROC CS+CSS	NEAR N., DHICKEG, MHICKEG AN, AAN NE, 189800 218	;Active page ;selected attributs ;modify memory block ;Ack for \$4X
MEAKET!	POSH POP THE H block HOW HOW INT CALL	CH CO CH MITTINGS. AND SOM MITTINGS. AND SOM MITTINGS. AND SOM MITTINGS.	:Block wast helong to	OC. MAR VPAGE AFTA	PROC CH+CKS MOV MOV 1NT JNC	MEAR MEAR NO, DHICKEG, MHICKEG AN, 4AH MK, 1898H 21M MHTUP_8	;Active page ;selected stributs rmodify memory block ;aak for 44K ; Thre Dos ;zump if no error
MEAKET!	POSH POP THE H block HOW HOW INT CALL	CH CO CH MITTINGS. AND SOM MITTINGS. AND SOM MITTINGS. AND SOM MITTINGS.	:Mock must belong to : Emaident Copy	OC. MAR VPAGE AFTA	PROC C8+C63 HOY HOY HOY HOY HOY	BEAN N. ORICEGE, MRICKEG NA, 1848 SK, 1848 218 MRTUP_S CO. OFFET REMORES AN, 9	;Active page ;selected stributs rmodify memory block ;aak for 44K ; Thre Dos ;zump if no error
Copy string	Push POP How H bloc How How CALL Ups from to the REM CALL	CH ON THE METINGS. AV.581 BY.58 SY.58 21m PIBO_COM Be new copy at CHAPTISCO HOVE ONLY OTHERS	: Niock must h-loop to ; geardent clop seemly slowsted block. mixers.	OC. MAR VPAGE AFTA	28 28 28 28 28 28 28 28 28 28 28 28 28 2	BEAR. BEAR. DO 1 COREC. NO 1 CRES AND AND NO 1 CRES 218 100 CO OFFICET NEWOKIE AND 5 218	ractive page resoluted attribute racdify managy block rack for dag race to arror raced more room raced more ro
Copy stric	Push POP How H bloc How How CALL Ups from to the REM CALL	CH ON THE METINGS. AV.581 BY.58 SY.58 21m PIBO_COM Be new copy at CHAPTISCO HOVE ONLY OTHERS	: Niock must h-loop to ; geardent clop seemly slowsted block. mixers.	OC. MAR VPAGE AFTA	PROC C8+C63 HOY HOY HOY HOY HOY	BEAN N. ORICEGE, MRICKEG NA, 1848 SK, 1848 218 MRTUP_S CO. OFFET REMORES AN, 9	;Active page ;selected attribute rmodify memory block rack for 44K : Thre DOS ;rump if no error

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■ UTILITIES

RE29_01	CLI		Disable unterrupts		MOV TWY	AX, GCFFH	: Terminate : Thru DGS
	STE	67,8777EN	:Move stack to end of a-; :Brable interrupts	88717	ENGO		,
Editing re	quires th	at we be in a test mode.		,			/ W. W
Clear enti		to desired attribute.		s affect of pr	a 7 or ompt to	H answer. Beturn Cf : print.	f was, at af So. of value.
	CALL	VIDED_SETUP AL, COL_MMD	: Enamine wides bardware	GETRESPONSE	PROC	SEAR S. DS:CTES, ES:CSES	
	108	AL, 2 COL MAN, AL		A. C.	mny	AT-1	-france string to
	4011		,		INT	216	: Then bed
	CALL	CLR_SOS	ibraw the window	GETS_F:	CML	GETSET	;Get a keystruk-
		ditor. Neturns when F7			AND	AL, BOT 261	:Capstalier
	CALL	#DIT	istring editor		OF	AL, "N"	III We,
	MOV	CS, COM PTR CK.DPPRET STRINGS	Get program length		396	GETS_1	rif equal, CY is -f?
	809	CX, DFFSET STRINGS STRING LES, CX	eigus start of strangs 18 strang length	GET#_1:	PET		2 just end
					CHP ZHS	AL, "T" GET9_8	:If not YKS, : try apelo
	cq++ show	ld be written out to AXP	SPREW.COM. If not, just -nd.		FTC PET		scarry on
ETV#_1 :	HOV	DS, OFFIST SAVES CETRESPONDS	;Clone the charges? ;Tes or No.	GETRETPORTS	ENDP		
	3c	METUP_2)Tee, continue	,			. 14.44.444.47
	INT	AX,4093B 215	Permissis normally thru 906	: Determine al	the p	eranters and info we s set if incommeptable no	eved to handle the display.
				CDGOS_ATTS	squ	178	iferte whiterbive
	n the fil	e to see if it exists.		SW APTE	800	#7x	;Reverse vidro
E464-5+	MOV	AX, 30426	:Open file for E/W	VIDED_SETLP	PROC	SEAR IG. DO-CSEG, SS-CSEV	
	INT	GE, OFFEST FILESAME	Thre pare	ASSUME			
	ac	SETUP_3	Jump if not found		200 207	AX,078 188	: Get wideo ecul-
	MOV	BE,AM	;move headle		207	ATTR, COLOR_ATTR	; Assume roles accres
	CALL	GETRESPONSE	(Should we overwrite?		CHP	AL,3	200A WHERE RIGHTS
ETUP_ZA:	ae	SETUP_6	(Tee		366	VID_J	: are obay
	HOV	AX, 306 218	rtiese file hendle		26	ML,7 WED 2	KDA test mode 10 oksy, too.
	JHP	SETUP_1	; Ask equie		arte	-	;Sime, an error
rile doss		. Attempt to open as no		920, 21	RET		:Return
STUP_31				V20_3+	MOV	ATTR, BY_ATTS	:Force S/W
	NO.	AZ, 3CB CB, CX	create file fs		HOT	COL_END.AX VPACE.EE	igase core-ry lade
	HOV	DE, OFFENT FILEMANE	this is name				
	Jac	SETUP_NA	(Opeced OK, jump	; Determine if			Lied, and find irw rount.
	207	ON, OFFEET PERSONS SETREMPOSS	stror opening file		HOV	AV,120	: PGA alternate nelect
	30	SETUP_3	;Tee		CEP	16e 81,16e	:Theu #105 :II #1. unchanged
STUP_JA:					H0V	DL, 24 Y2D 4	; Set default rows
	907	DX,AX	:Put handle in SH		PORK	54	Changed by rall
A velid fi	le hardle	ie is Ar. Write swey.			MOA	AL,11301	
ETUP_4:					187	164	thre stee
	NOV	AH, 486 CE, COM PTR	y Write to file fo	VID 41	POP	**	
	803	Ct. 1697	: Sinus PSP length		SCA	NOW_END.CL	Igane Love
	907 THT	06,1886 218	Pointer to DTA Thru DOS		RET		
	Je.	SETUP_5	pCT mignals error	V2580_16719	EMBP		
	78	MI,CE PETER_F	All bytes written?	Position the	CEEC	r to the stored values	
An error v	M4 400000	tered on the write.		CUR SET	Page	FEAR	
RTUP_51				AFFINE	CR+CE	EG, DG-CEBG, ES-MOTRIM	
	CALL	DE, OFFEST WERBORS GETRESPONSE	(Try equie)		POEX	AX	Steam ment tedinged.
	30	SETUP 4 SETUP 2A	;Tee		sov	AH, 2	(Position curser to
					HOT	BX, VPACE DX, CURSOS_POS	current page
rile wee v	wittes ea	ey. Close and emit.			187	188	; Thru #100
ETTEP_0:	M097	AR. 257	Alan file badle is as		107	AX	:Restore register
	INT	216	Close file handle (n EE Thru DOS				
							(ASPRN ASM continu

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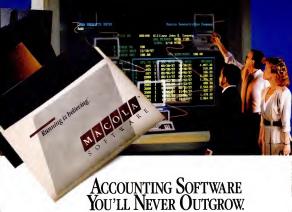
into action.



UTILITIES

RET C18_887 END?

The PTR offe	et point	e to the character	that appears at the left side	en())	38 38	INS STATE, 0 RET_IA	;If insert
of the winds	LANGE	WEED	:Indicates the starting	1 If et en	d of etrip	e, typeower works just	libe immert.
AN PTR TS_PTR	CW.			1	CALL	LOCATE SI	off current char
тв_ртя сттук	DN:	:	: macro name and string :Index for Stray		OKP JNB	erre effe (ez),e ezz_le	; jest overwrite
	column 5	or positioning the		SET_IA:	CALL	6722HG 288 MCT2VEG#	:Create hole at cursor
UNIFOR POS	SARES.	MORO			298	RET_16	
URSON COL	D8	:	;Curfect dufect ; pomition	FET 16:	XMC	PTS_ARRAT(2)	; advance second
ACBO_PTR	06	:	¡Pointer to etring set	1 '	CALL	POTCHAR DEFFLAT	:Put AL et Cureor :Show changes :Pell through
00_STATE	DIE	•	P-ING PP-TTPGOVES	J -> North	the cureo	r to the right one ere	
DIT	PROC	HEAR		REY_1C:			
Alle total	Ca+CES	NACRO PER. P	(Choese first string	ME NO	CALL	CURSON_RIGHT	; Move cursor along
				,		her. Nost be an icel	
Display the	Macro 1	atter for these str	inge.		n eenended	may. Must be an icet	ruction.
007_1+	HOV CNA	CURSOR_POS, PIPER CUR_SET	phove to row 1 col 2	KEY_21	CHP ZHE	AR, PTRET	:F7 is the exit key
	mov.	AH, FAH	(Write character) char to write		90V 90V	CURSON COL. #	Meposition cursor
	960V	BL, ESC_CHAR			CALL	CUR SET	
	INT	284	1 Three 8106		RET		; and the only way out
	CALL	CURSON COL CUR_SET		: All rena	ining hey	dispetch done from her	
	MOV.	AH, SAH AL, HACBO_PTH	:Write character : number of nerro	RET 31			
	ACO		; convert to letter		MOV	SL, MACHO_PTR	/Mumber of est
	THE	CH.1	: Three Bros		00P	AN, DEL. NEY_PA	;Kill char et cursor
Initialise	the poin	tere to palet to the	first macro set.		CMP 28	AN, POUP SET 3A	; Check for PqUp
	CALL	LOAD_POINTERS			CMP Jr	AN, PODM REY 5	; move to next macco
Disaben Abe		d atainer on the one	een se reed from meetry.		MIT	M. ACTOR	
	MON	8X, 0	; Index for ware		CHP CHP	AL MARKY	,sowe right 1 cher
	CALL	MAKE ACTIVE	/Put cursor in mass /thow the string			MENT_DC	
	MOV.	BX, 2	;Index for Secre		28	MET_S	;Hove laft
017_2+	CALL	NAME ACTIVE	; but curser in Macks other the string		CBP JE	RET_12	IMOVE UP
Cot a hour f	on the	erheard and act on			CEP	AM, DARRION MET_24	; Hore down
ET_0:	Caco.	orysours and act on	rised a her into AS		œ	AN, 298 MNY_23	;Use Insert mode
	06	No.AG	off 6. is extended		OIF	AM, ENDERT PET_16	swore to end of etring
	JII CNP	KEY_2 AN-FS	which means command If not ectual 35 her		cor	AR . BOME	(Nove to start of stri
	200	AV.AN	:If high byte is zero		310	MET_07	plidart recoopsize it
	38 38	SEY_L	; If high byte is zero ; Process as ther	1		the previous macro.	
			requires special handling.		. ~/6 to	the previous matric.	
Treet 66 as	e CUERO	-LEFT/DELETE COMDIS	etion.	MET_JA-	980	NL.	(Back up
	CALL	CURSON LEFT FET_S			CHP	NL, P EET_4	; If below 9
IY_BA:	CALL	STRIPS OEL	; Delete char et cursor	SET 4:	MOV	NL, 25	; reset to end
	CMA	DISPLAY			3677 2307	MACHO_PTR, BL EDIT_1	stydate pointer sitart ower
	CHP	ACTIVE, 6 MEY_0	if deleted from first	i PgDn key	. Nove to	the meet macro.	
	****	20.0		1			(ASPRN ASM cont



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■ UTILITIES

	THC CHP JHE	8L 81, 25 857_4	pto forward plf past end		HOV HOV HOV	AN, SAN CL, COL_END CN, CN	;Get middle ober ;Write repeated cher ;Width of box
	200	ML, ML MET 4	;Reset		INT	CX, 2 18H	; minus 2 mides ;Thra B106
for House Sh		to the left one space.			MOV MOV ADD	AN, 2 DL, N DL, COL_EMD	Position cursor
EET 2:					DEC	DL 188	Col = righthand odgs Thru HIOS
ERY 10:	CALL	CURSON_LEFT	(Move cursor left		Looms		Get rightmost ther
	2007	MET_0	(Failed, ignore it		MOV MOV	AF, SAE CE, 1	Write ther
, " Howe to	the FAR	E field.			187	100	: Three sizes
KRY_12:	CHP	8X,0	olf elrests ective		P07	cx	:Restore counter
	16	KKY_10	1 Idease		JE JE	CE_2	illessine row we wrote
	HOV JHP	8X.9 E027_2	:Else, switch	1	CHP	CL. 2	per next to last
y Hove to		INO field,		CH 1A:	ADD	cm_1A er,3	inou. c sejiest count
EXY 14:				Ca_lai	TEST	CL,1 CB 2 BI,6	;If yow is even ;bon't edjust count
-	CHP ZE	HX, 2 PAY_10	ilt elready scrive	00_31	200		
	1939 2167	NX. 2	jelse, switch	1	LOOP	CB_1 CURSON ROW.P	:Too row
Toggle the		EDIT_2			HOV HOV	AL, COL MAX AL, TITLE LEX+5 CURCON COL, AL	:Top row :Hightmost column :Becksp : to here
FET_15:	807	IND STATE	staggle the fleg		MOV	NI, OFFERT TITLES	'htoften zene
, Howe to end	of stri	KET_N			MOV MOV	CURSON POS,87818 SI,OFFSET SELFS CB 3	;Instructions
FET_16:					907	CURSON POS. NOSLE	
-	JNC JNP	CURROR RIGHT KEY 16 KEY 0	; move to the right ; me leng we successful		CALL	CB_3	;And titles
) Move to sta				CB_31	M04	CURSON POS,85818 SI,OFFEET MACHOS	
EXY_17:				CB_3A+	CALL	CUR_HET	/Position cursor
	CALL	CURSON_LEFT EET_17	;move to the left ; se long so successful	A	MOV LODGE	WW, VPAGE	(the active page (that a char
	30	MEY_0		1	09	AL.AL Cg_4 AH.#XH	:11 0000
8017	2907				18T	186	: Thru BIOS
,				CB_4+	JAP BET	C0_3A	CONTINUE
	for a) for our information o	n the screen.				
; Add a horder		site touch.					
TITLES	DO EOU	6058, "ASPRI 1.6", 8066	,0	CLR_HOM	ENDF		
TITLES TITLE_LEN MELPS	DG EQU DG DG	#858, "ASPRE 1.8", 8066 8-717LX5 "BTEING: ",27,32,26,"	,0	write the	character HI	in AL to the string s	e sī.
TITLES	DG EQU	6058, "ASPRI 1.6", 8066	,0	Write the Changes: Cells:	character HI LOCATE	.61	e si.
TITLES TITLES LEN HELPS HAKES HAKES	DG EQU DG DG DG DG	6058, "ASPEN 1.0", SCH 5-TITLES "BTRIMS: ", 27, 32, 26, " " BACHO: PETP FROM "MANE : ", B "MACEO:", B	,8 INH DEL *,24,32,25 27 * dave*,P	write the	character HI LOCATE PROC	SI NEAR	e 2I.
TITLES TITLES LEN HELPS HACGOS BOX_CHANG	DG EQU DG DG DG DG DG DG	#858, "ASPEN 1.8", #CON 5-TITLE; "BTEING: ",21,32,26," " MACRO: Pgip Pgon "MACRO: ",8 "MACRO:",8	,8 INH DEL *,24,32,25 27 * dave*,P	Write the Changes: Cells:	Character BI LOCATE FROC	.61	e 2I.
TITLES TITLE LEN HALPS HACGOS BOX_CHARG HOW CLE BOX	DS EQU DS DS DS DS DS DS DS DS DS DS DS	#858, "ASPRO 1.8", SCAR S-TITLE: "STEINS: ", 27, 32, 26, " " SACRO: PUTP PSTO "MACRO: ", 8 **CFS, COS, SERN, SAAN, 8 109, 106, 102, 3050, 3000 **EAS	,8 INH DEL *,24,32,25 27 * dave*,P	Write the Changes: Cells:	character HI LOCATE PROC	SI NEAR	9 EI.
POTTLES TITLES T	pa pa pa pa pa pa pa pa pa pa pa pa pa p	#858, "ASPSM 1.0", ECG 5-TITLE 5-TITLE - STEERS ", 27, 32, 26, " " SACHO! PUTP FORD " NACHO!", B 9-CFM, FOOD, \$MEM, \$BAM, \$ 100, 100, 102, 8-CM, \$CM \$ #EAR 0, DHICERO, EMISOTHING	,8 196 GEL *,24,32,25 27 - saver,6 286,83AM	Write the Changes: Calls: 	Character EI LOCATE FROC CALL MOW NET	SI NEAR	9 EI.
TITLES TITLE LEN HALPS HACGOS BOX_CHARG HOW CLE BOX	DS EQU DS	6939, "ASPER 1.8", SCHE 8-717121 8-717121 9-717121 9-71721 9-7	,8 INH DEL *,24,32,25 27 * dave*,P	Write the Changes Calls FORMA	Character EI LOCATE PROC CALL HOW NAT EMBP	SI PEAR LOCATE SI [SI],AL cher in the string t	# EI. ;Point to exter local ; end pop in that
POTTLES TITLES T	DO EQUIDO DO D	HD32-ADFRH 1.8", #CHE ***PETRINS **, 27, 32, 26, ** ***PETRINS **, 27, 32, 26, ** ****EACCHO!** PETP FROM ****ACCHO!** ***ACCHO!**, 28, ** **********************************	June 8EE - 24, 33,25 27 - sever, p Not, Shart Jecon Importal vindow for Jeles to this color Jed cov.eol	Write the Changes Calls PSTCHAR PSTC	character BI LOCATE FROM CALL MOY RET BEOF	SI MEAN LOCATE SI [NI],AL sher in the string t	:Point to earer local ; and pop in that hat is currently above the
POTTLES TITLES T	DOS EDU DOS	#B32 - ABFRE 1.8", #COM ************************************	Jun 0EL - 7.24,33,25 77 - 0800**, P 790,88aar ,8508 Juneall vindow for place to this color paner tow, col. 1986 to this color paner tow, col. 1986 to this color paner tow, col. 1986 to this color paner tow, col.	Write the Changes Calls FORMAN FORMAN Point HI t Cursor of Changes Canges Changes Canges Cange	character at Locars FROC CALL MOY RAT EMBY St.	PEAR LOCATE SI (EST), ALL when in the string to ESTATE SI ESTATE S	; Point to cursor locat ; end pop in that hat is currently above the
POTTLES TITLES T	DG EOU DG	1801, "ADDRE 1.8", #COME "POTENTS 1.8", #COME "POTENTS 1.8", 12, 22, 26, 18, 18, 18, 18, 18, 18, 18, 18, 18, 18	A 100 GEC -, 24, 22, 25 27 - GROWN -, 15	Write the Changes Calls FORMAN FORMAN Point HI t Cursor of Changes Canges Changes Canges Cange	character at Locats Locats FROC CALL MOV NAT EMBP	PEAR LOCATE SI (NEI), AG other in the string to the strin	point to exerce locat read pop in that read pop in that read pop in the content
TETLUS EN ELM	DOS EQUI DOS	HD12 - ADFRE 1.8", #CHE FORTHWIS - 27, 22, 26, - FREEDRIS - 27, 22, - FREEDRIS - 27, 22, - FREEDRIS - 27, 26, - FREEDRIS - 27, - FREEDR	A 100 GES - 24, 22, 25 17 - GREY - 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Write the Changes Calls FORMAN FORMAN Point HI t Cursor of Changes Canges Changes Canges Cange	Character BI LOCATS FROC CALL MOV NAT EMBP IS THE SECOND IN THE SECOND I	PEAR LOCATE SI (NEI), AG other in the string to the strin	point to exercy local popular to exercy local popular to exercit, shown the
TETLUS EN ELM	DG EQU DG	1803, "ASSEMI 1.8", #COME -POTTAGE -POT	A 100 GEC -, 24, 22, 25 27 - GROWN -, 15	Write the Changes Calls FORMAN FORMAN Point HI t Cursor of Changes Canges Changes Canges Cange	character EL COLATE FROC CALL MOVE SET SET SET SET SET SET SET SET SET SE	ST PEAR LOCATE SI (ET), AL wher in the string to XX EEAA EL,ACTIVE SI, PTE, ANDAY(EE)	point to cursor local g and pop in ther hat is expressly shows the jost nettyme inds a jost nettyme inds a
TITLES TITLE LEN HALPS HACGOS BOX_CHARG HOW CLE BOX	Dig Roys on a control of the control	905, 34800 1.7 4000 1-07131 1-	of other 1,70,20,20 27 - every 2, 20,20 27 - every 2, 20,20 28 - every 2, 20	Witte the Changes Valle the Changes Calle PROCESS Calle PROCESS PROC	character BI LOCATE BI LOCATE BIO LOCATE BIO CALL MOV BET BIO BET BIO BIO BIO BIO BIO BIT BIO BIO BIO BIT BIO BIO BIT BIO BIO BIO BIT BIO BIT BIO BIT BIO BIT BIO BIT BIO BIT BIT BIO BIT BIT BIO BIT	PEAR LOCATE SI [SEI], AG ether in the string to to HEAR BS_ACTIVE BS_ACTIVE CS_CS_COMEON_COS.	point to cursor local g and pop in ther hat is expressly shows the jour nettwo links g jour nettwo links g jour nettwo links as g jour ne
TETLUS EN ELM	DG EDG DG D	POR. NAMES 1.0", 400E PORTAGE 1.27, 32, 24, - PORTAGE 1.27, 32, 24, - PORTAGE 1.27, 32, 32, - PORTAGE 1.27, 32	of sets. 1, 24, 25, 25 77 - seve. 15 78 - seve. 1	Write the Changes Calls FORMAN FORMAN Point HI t Cursor of Changes Canges Changes Canges Cange	character EL COLATE FROC CALL MOVE SET SET SET SET SET SET SET SET SET SE	PEAR LOCATE SI [SEI], AG ether in the string to to HEAR BS_ACTIVE BS_ACTIVE CS_CS_COMEON_COS.	point to exerce locat read pop in that not in exercity above the plost nettive locks - plost nettive locks -

■ UTILITIES

Changes: Calle:	SI,DI,	me string by moving ev CX I SI			A .	STE PTR (SI),S	(Past start of string) (Yes, jump
TRING ING	PROC	16M			CALL	PTS_ABBAT[SX],SI DISPLAY	
-	CALL	LOCATE_SI	#85 - current cher		CLC PET		
	1629 1629	CE, COM PTR	gind of strungs offset	CURROR_LEFT	ENGP		
	6116	CN.SI.	its also target for nove imptee to move	CURNON_RIGHT	2002		
	907 060 870	91,00 91	(Copy to source requeter (Copy from previous byter (Nove becoverds	; On entry EX ; selected str	coeteir	ne S - Same or 2 - Stri	ng. This proc makes the ition is determined from en jumping up and down.
	REP	M2918	; whole string :Pile is looser	; the pointer ; Changes:	De	me and are retained wh	en jumping up and down.
	190	COM_PTR	Paris is londer	NAME ACTIVE	7900	PENA	
	RET				MOV	ACTIVE, EX	;Change active index
MEING_ISS	21454				ROV	CURSON COL, 7	pleftmost column
			***************************************	1	HOV	DH, 3	plow for name
	Cx,sI,		the string.		OR JI	MA_I	; if be-d
Celler	LOCATE	-		N.31	MOA	00,5	reles yow for string
DEL DEL	7900	FEAR			NOV	CURSON_ROW, DIS	;tieve coorde
	CML	STEE PER (ST), S SD 1	Point to current rher Cet't beckup too fer	MATE_ACTIVE	2000		
	STC		;seree	1		for a new macro set.	
1.	***			Chapees:	ML.		
	808	CE,COM_PTR	:End of strange offset :Sytee to move	; Celles	GET_N		
	DEC	CK OLST	one less	LOAD_POINTERS AGGUNE	PROC CS+CSS	NEAR NO, DE-CERO, BE-COMO	
	INC	91	scopy from previous byte		MOV	SL, NACRO_PTR	:String to look for
	CLD REP	20723	;Nove beckvards		815	85.,1	; they come in pairs
	DEC	COR_PTR	(File gate aborter		CALL	OUT POLYTER HAM PIR, SI	stead pointer steve offest
MINO_DEL	BAT				INC CALL	SI. GET PODETES	Seet string Load soluter
-	2107				MON	SL GET PODETES STE PTR, ST	Seet strling Lood pointer Sewe offset
Nove the cu Changes: Calls:	EMOP	E/Fight I char. Metu si, cum ser, Dimplay	es MC if success. CF lf Impl.	LOAD_POINTENA	RET ENCP	ent[PTR.ex	riced pointer riseva offset
Nove the cu Changes: Cells:	ENDP ICROF LEG SI,Cx LOCATE PROC	MEAN DEST, DESPLAY		: Find the SL:	MET MET MET MET A strict	g in the list. S-bose	
Move the cu Changes: Calls: Reson along	ENGP SI,CX LOCATE	SI, COM_SET, DIMPLAY		; Find the Size ; to the start ; Changes	MET EMEP THE STATE OF THE AND STATE OF THE AND STATE OF THE STATE OF T	ers Pra, si g in the list. S-bose string.	riced pointer riseva offset
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Move the cu changes: Celle: Rason alder	ENDP IFFOR 185 SI, CE LOCATE PROC CALL COP JOE STC RET	MEAR LOCATE SI STIE PER [SI], S CR_S	ikrs we on lest ther jot strings jop if yes	: Find the SE : to the start : Cheoper GCT_POINTER ANNUAL	MET EMEP THE STATE OF THE AND STATE OF THE AND STATE OF THE STATE OF T	ers Pra, si g in the list. S-bose string.	
Nove the cu Changes: Calls: Nados_arcer	ENDP EFFOR LOCATE PROC CALL CMP JAR STN:	SI, CHEST, DISTLAY HEAR LOCATE SI STIE FTR [SI],S CE, CC., CURSON CO.	pars we on lest their out strings yes if yes saignal feibers	; Find the Size ; to the start ; Changes	MET ENCO	STE PTR.SI g in the list. S-base string. SI SEAN D, DS-CORD, ES-CORD SI,OFFGET STRINGS SS.SE.	
Nove the cu Changes: Calls: Nados_arcer	THOSE INC. SI,CE LOCATE FROM CALL CAS STOR ART ROY CAS JE ROY CAS JE ROY CAS JE ROY CAS JE ROY JE RO	EI, CUB_BET, DIRPLAY MEAN LOCATE SI STIE FIR [SI], S CR_S CS_CURBON_COL CC_COL_MAX CS_2	ikrs we on lest ther jot strings jop if yes	: Find the SE : to the start : Cheoper GCT_POINTER ANNUAL	MET ENCO	STE PTR.SI g in the list. S-base string. SEAR N. D6-CHEG. ES-CREG EL, OFFERT STRINGS	
Nove the cu Changes: Calle: Nace stdorr	ENDP BI, CE BI,	EI, CIB SET, DIRPLAY MEAN LOGARTS SI STITE FER (SI), S CS, CURROR COL. CS, COL, DAX CS, CT, CT, CT, CT, CT, CT, CT, CT, CT, CT	lars we on lest ther rot string? you if you salepant feilure ils curser at acress edge 1780, Juny (more to sent cell	Find the SLI 1 to the start 2 Changes GET_POLITER ALCOHOL	MAT ENCO MET	STE FFR.SI g in the list. S-bess string. SEAR S, D6+CNPG, E8+CNPG SE, OFFSET STRINGS SE.SE	riced pointer rease offeat d. Meturne HI pointing return come bore retring counter receive to right atom
Nove the cu Changes: Calls: Mades_arder	THOSE INC. SI,CE LOCATE FROM CALL CAS STOR ART ROY CAS JE ROY CAS JE ROY CAS JE ROY CAS JE ROY JE RO	EL, CUB_SET, DESPLAY MEAN LOCATE_SE STITE FTE [SI],S CL_CUTBOOK COL. C	jare we on lest cher jed string? Sep if yes iniqual failure 12s curses at acresh odgs 1294, Jump	: Find the SE : to the start : Cheoper GCT_POINTER ANNUAL	ENT ENTO	STE TRACE SEAR STORM STORM SEAR STORM STORM SEAR STORM STORM SEAR STORM STORM SEAR STORM SEAR STORM SEAR STORM SEAR SEAR STORM SEAR SEAR STORM SEAR SEAR STORM SEAR	plond politar preve offsat d. Matures HI politing District sees here producing to right attain His processing to right attains attaining to right attaining to rig
Nove the cu Changes: Calls: Mades_arder	ENCP IFFOR 1st SI, Car SI SI, Car SI SI SI SI SI SI SI SI SI S	EI, CIB SET, DIRPLAY MEAN LOGARTS SI STITE FER (SI), S CS, CURROR COL. CS, COL, DAX CS, CT, CT, CT, CT, CT, CT, CT, CT, CT, CT	lars we on lest ther rot string? you if you salepant feilure ils curser at acress edge 1780, Juny (more to sent cell	Find the SLI 1 to the start 2 Changes GET_POLITER ALCOHOL	ENT	ord ora, or	please polating . metures at polating inters seek here inters seek here inters seek here inters seek here inters on right state jou, heep scenare
Nove the cu changes: cells: Radon_sider	ENGP ICOC Ind II, Ca II, Ca III, Ca	EL, CUB SET, DIRPLAY MEAN LOCATE SI STYL FIR [SI], S CL, CURSOR COL, CL, CCR, MAX CL CURSOR COL, CL CURSOR COL, CL CURSOR COL, CL CURSOR SIT	plans we on less ther est strings you if yes stignal failure lin cursors at morsen edge lyne, you journe to mest col journey t	Find the SLI 1 to the start 2 Changes GET_POLITER ALCOHOL	MATEURS AND	STE TRACE SEAR STORM STORM SEAR STORM STORM SEAR STORM STORM SEAR STORM STORM SEAR STORM SEAR STORM SEAR STORM SEAR SEAR STORM SEAR SEAR STORM SEAR SEAR STORM SEAR	plond politar preve offsat d. Matures HI politing District sees here producing to right attain His processing to right attains attaining to right attaining to rig
Nove the cu changes: cells: Radon_sider	THE	HEAR HEAR HOART, 92 STTE FTR [92], 8 C1, CHEOG. CO. C1, CHEOG. CO. C2, 2 C2 C3 C4 C7 C8 C8 C7 C8 C8 C7 C8	play we on lost char and vertiney by if you mitigat failure like cursor at across odgs james to east cell lates opening updates; played to east cell lates opening updates; played some james to east cell	Find the SLI 1 to the start 2 Changes GET_POLITER ALCOHOL	CALL HOV NET ENCO ALL LOT UN ALL LOT LOT LOT LOT LOT LOT LOT LOT LOT L	ord ora, or	plond politar preve offsat d. Matures HI politing District sees here producing to right attain His processing to right attains attaining to right attaining to rig
Nove the cu changes: cells: Radon_sider	THE POST INC.	EAT, COM BETT, DISPLAY MEAN DEATER #18 ETTE FTR [81],8 C1, CTMORR COG. CTM	into we on lest ther set strings you if you stings failure If covered a cream odgs sym. you set on the col ideas symbol section july a second symbol second	Find the SI; I to the start I to the start I choose Out popular Autom Op 5: OP 1:	CALL MOV RET ENDP th atrice of the AN, 66, PROC CO-COST BOY JUST LONG ON JUST BEST BEST	PTE_PTS_AT	riced polater reconstruction . Matterns of polaticity ritters seed here ritters seed here rittering constructing to right stand ritters reconstructing to right stand ritters reconstruction
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Acre the cu changes: Cells: Nadon_sider	ENGP STORY STO	EI, CHR. STRICKT BEAK BYER FR [SI], S CL, CYMBOR, COG. CL, CG, MAX CS, CS, CS, CS, CS, CS, CS, CS, CS, CS	INTO we can least other red work of the case of the ca	Find the Sill I to the steel of the Sill I to t	CALL MANY MANY MANY MANY MANY MANY MANY MANY	erg_yrm_at; eg in the list. B-hose eg in the list. B-hose eg in the list. eg in the list.	riced polater research and rese
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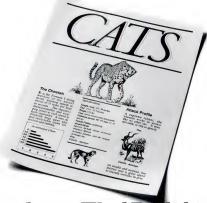
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the feel of the program and improve your productivity immediately, let's start by creating a macro that sends a form-feed

code to the printer. First, start ASPRN in setup mode, as described above. The window will appear and the fields should be blank except for the macro name, where you should see -A. The cursor will be positioned on the line marked MACRO:. Make sure that NumLock is off, and press the Up Arrow key on the keypad to move to the line marked NAME:. Now type the phrase, "Send a form feed to the printer". The Name field doesn't affect the macro expansion, so you can be as elaborate as you wish

If you make a mistake when typing, don't panic-full editing support is provided for the strings. As you would expect, the Backspace key removes the character preceding the current cursor position, and the Del key removes the character right above the cursor. If you delete characters in the middle of a string, the editor will close up the string automatically. Insert and typeover modes are toggled by pressing the Ins key.

To switch between the Macro field and the Name field, use the Up and Down Arrow keys. To position the cursor, use the Left and Right Arrow keys to navigate through the string. Rapid movement to the

 If you make a mistake when typing, don't panic --- ASPRN provides full editing support for the strings.

extremes of the edit field is provided by the Home and End keys, which will take you to the beginning or end of the string, respectively. Although we're working with only a single macro in this example, you can move between macros at any time by using the PgUp and PgDn keys.

The ASPRN editing window is video environment aware and will automatically

adjust to fit any video mode that has a screen width of more than ten characters. (If you have a color video system, try bringing up the editor when you're in 40column mode.) But since there is no practical limit on the length of a string (strings can be nearly 64KB long), the problem of displaying strings that exceed the available display space on the screen still exists. To solve this problem, ASPRN uses a single line of displayed text that scrolls left or right as needed. The cursor remains always in the visible portion of the string. Users of Lotus 1-2-3 will feel right at home using the ASPRN editor. I liked the look and feel of text scrolling off the left and right edges of the screen, and I patterned my editor after it.

ENTERING CONTROL SEQUENCES After you've entered the descriptive name for a macro, use the Down Arrow to move back to the Macro: field. Note that there's no need to press the Enter key at the end of the line. Entering the control string is as easy as typing the macro name. Since the ASCII code for a form-feed is Ctrl-L, simply hold down the Ctrl key and type the letter L. A single, strange-looking character will appear in the display. This is the representation used in the IBM character set to display character 12, the form-feed. If the macro string you need uses the ESC character (ASCII 27, or 1Bh), as most will, just hit the Esc key.

While other sequences will undoubtedly be more complex, this one is complete. To end the session, press the F7 key. Any time you terminate an edit session, the following prompt will appear:

Save changes as ASPRENEN.COM (T/N) ? Type the letter Y to save the changes you have made.

To help make our lives as trouble-free as possible. ASPRN absorbs the control strings you enter and makes them part of its COM file. Thus, when the editing session is concluded and you decide to save your changes, ASPRN modifies itself to include the new strings, updates all the parameters used for loading, and writes out a cloned version of itself under the name ASPRN-NEW COM

The name you give to the ASPRN program on your disk makes no difference to

the program itself-it still knows that it's really called ASPRN-so several versions can exist at once. For example, you could have ASPRNJOE.COM and ASPRN-PEG.COM, and each person could customize the control strings to take advantage of his printer, word processor, or typing habits.

If you wish, you can replace the old

 To help make our lives as trouble-free as possible, ASPRN absorbs the control strings you enter and makes them part of its .COM file.

copy of the program with the new one. If both files are in the current directory, simply execute the following commands at the DOS prompt.

COPY ASPRNNEW. COM ASPRN. COM DEL ASPRNNEW.COM

LOADING AND RUNNING ASPRN Once the file has been edited, saved, and optionally renamed, it can be loaded. Because ASPRN is a memory-resident program-and one that deals with the printer-a few precautions should be taken. ASPRN should be loaded after any print spoolers and after any redirection using the MODE command has taken place. Although ASPRN is memory resident, it's not a pop-up and doesn't use the keyboard interrupt at all.

All that's required to load the file is to execute it. Do this by typing at the command line. Using some compli-

cated relocation techniques, ASPRN will worm its way into memory, shrink down to a minimum size, and stay resident. From that point on, any output will be filtered through ASPRN and expanded as re-In our example above, we defined A

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as the form-feed character. To try it out, type the following instructions at the DOS prompt. (Be sure that you have a printer connected, turned on, and ready to print, and that the top-of-form is properly set.)

COPY CON PRN THIS IS LINE 1 THIS IS LINE 2 A ^Z

To generate the 'Z, cither press the Fo key, or hold the Ctrl key and tap the letter Z. DOS will then copy the two lines of text to your printer, and will then try to send 'A the same way. But ASPRN will intercept it and substitute the form-feed. Your effort should be rewarded by the page ejecting from a sheet feeder or advancing to the top of a new form.

THE MACRO CHARACTER The tilde character doesn't appear very often in Common Business Letters. But some applications may use it (1-2-3 uses it to represent a carriage return). Should you find a need to print a tilde, you have several options available. The first is to use a double tilde ("-). When ASPRN sees two macro characters in a row, it de-

 Should you need to print a tilde, you have several options available with ASPRN.

letes the first one but lets the second pass through. This is a good way to deal with an occasional use of the character out of the macro context.

CHANGING AT LOAD TIME When you have a version of ASPRN that you would like to load, but you want to change the macro character for that session, you can use either the /M or the /C command-line switches.

They both perform the same function: they change the macro character when the program is loaded into memory. They

don't affect the copy on disk in any way

Two switches that perform the same function are required because of the input limitations of DOS. While many characters you might want to use to initiate the macro sequence can be typed in at the command line, some simply cannot be. For example, changing the macro character from the tilde to the pound sign can be accomplished by entering

ASPRN /M#

Now all macros that previously began with the tilde will respond to the respective pound-letter combinations the same way. Note that if you specify the macro character in this way, on the command line, you must continue to do so each time you execute ASPRN during that session. This is because ASPRN is dynamically modified at load time. So to uninstall this version you must enter

ASPRN /M# /U

While the M switch works for common, printable characters like the pound sign, you can't use it to enter some characters that the IBM PG Uses for control. For example, up to enter the Backspace character (ASCII) 87 the Esc character (ASCII) 87 the Esc character (ASCII) 87 the prefer day a command for DOS and not as a character. For such cases, you can specify the macro character as follows:

ASPRN /C027

Your entry must be exactly three decimal digits, so include any leading zeros, and it must not be separated from the /C switch by any spaces. In the inset line above, ESC, which corresponds to decimal 27, would be loaded into the program as the macro character.

A MORE PERMANENT CHANGE If you change the macro character at load time, you must specify it every time you must be program. A more permanent and

time, you must specify it every time you run the program. A more permanent and convenient way to modify it is to invoke both the macro and the setup switches, thus:

ASPRN /S /M#

When the /S switch is specified, the program is not loaded into memory, but simply set up for editing. When the edit window appears, it will contain the name of the first macro, as usual, and it will also contain the specified character—in this case, #A. When this file is saved, using the F7 key, the change in macro character will be made permanent by writing it out as

the default in ASPRNNEW.COM.

Different versions of ASPRN with different macro characters act like totally in-

■ You might find it handy to keep a version of ASPRN around that simply translates the macro strings into their original form.

dependent programs. Thus, if you have created two versions, one using the tilde and one using the pound, both can be loaded simultaneously, yielding 52 macros. See 22 May be a seed to be a seed of the control of the seed of the seed of the one expansion contains a macro that needs to be expanded by the second copy of ASPRN. In that case, load the dependent version first.

TEMPORARILY DISABLING ASPRN
You might find it handy to keep a version
of ASPRN around that simply translates
the macro strings into their original form.
In other words, the string entry for the
macro - A would actually be - A, and so
on. Then, if a macro is accidently invoked,
the original characters will be sent to the

printer and no one will be the wiser.

There may also come a time when you want to remove ASPRN from memory. As mentioned before, built into the program is the ability to uninstall itself in an orderly fashion. You simply invoke ASPRN with the uninstall switch as follows:

ASPRN /U

Of course, to remove the program from memory, it must have been previously installed. And if you have loaded ASPRN

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with the 'M or 'C witch, you must specify the same writch on the command line when we witch on the command line when we will be the same of the work o

REPLACING MACRO STRINGS
ASPRN has the ability to allow the macro
definitions to be replaced at any time. This
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to make sure that in each case you use the same macro character. ASPRN can then replace just the strings and keep memory use to a minimum.

THE INSIDE STORY The assembly source code for ASPRN is heavily commented in order to make it accessible even to beginning assembly programmers. To explain the reasoning behind the code, I'll divide the narrative into three parts that correspond to the major parts of the program; the macro expander, the text editor, and the memory manager.

(Note that up till now. I have referred to the character used to designate a macro (e.g., the tilde in 'A) as the macro character. In reality, it is more appropriate to refer to it as the except character. I have avoided using this term to minimize confusion with the normal Esc character, IBh (or 270), in the broad sense of the term, an escape character has some property not as-

sociated with other characters. In our case, it triggers a macro expansion. In the assembly code, the terms escape character and escape societies will be used.)

MACRO EXPANSION MECHANICS Inoxically, the portion of the program that expands the strings is also the switchest the exists to understand. When first loaded and made residents, ASPRN splices into the chain for It II The printer interrupt. This is done by first saving the segment and offset of the old interrupt handler and then substituting ASPRN's own address. From that moment on any attempt to print

a character using the BIOS will be filtered through ASPRN first.

Once resident, the program sits quietly in the printer path and compares each character that passes by to the macro character. Assuming the tilde is the macro character, the logic is simple: If the character intercepted is the tilde, you set a flag and throw

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the character away. If the next character is not in the range of A to Z, you assume it's an error, so you reset the flag and discard the second character as well. If the second character is valid, control is transferred to the EXPAND procedure. The block of strings is then scanned to find the correct macro string, which is sent to the printer. The format of the string block in memo-

ry is illustrated in the diagram "String | Block Structure." Note that each macro requires two strings to describe it: the name string and the expansion string. One method of handling strings is to use a table of fixed-length entries. With this method. an arbitrary maximum size-255 bytes. for example-is allocated for each string. Then, no matter how small the string, 255

bytes of storage are always used. And because the length is fixed, the string can never be larger than the artificially imposed limit of 255 characters.

But if we use variable-length strings in the ASCIIZ format (a string followed by a byte equal to zero), the length of a string becomes irrelevant. A string is assumed to end when the zero byte is reached. By

String Block Structure



The string block is organized as a senes of 26 ASCIIZ strings. The last entry in the table is followed by an additional zero byte to indicate the end of the table. The strings may be any length; each one can be located in memory by counting the terminating zeros that precede it.

byte to

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reading the entire string block (and counting zeros to keep track of position), any string can be found. The fixed-length technique is fast, requiring only a few instructions to figure the offset of any string, but it exacts a heavy toll in flexibility.

The macro expansion is quite simple. Once the correct string has been located, the macro string bytes are sent to the printer, one at a time, through the original inter-rupt 17h handler. If an error occurs, the expansion is terminated and control is returned to the program that originally requested the printing.

EDITOR STRING HANDLING The operation of the string editor is reasonably straightforward and has much in common with most editors. It has two major functions: string handling and video display. The string handling functions embodied here can serve as a model for readers want to design their own editors or build

editing capability into their programs.
The editor's operation is based on the These ditor's operation is based on the Mesign specification that the string block will always be set up as a contiguous sequence of bytes in memory. The starting address of the first byte in the block is assumed to be known, and all other bytes are located by their relative offse.

To insert a byte at a certain locaion—for example, at the cursor position—for example, at the cursor position—for example the cursor must be pushed ahead in order to make room, increasing the length of the string block. To detec a byte, the bytes following the cursor are simply backed up one position, decreasing the size of the block. Overwriting just changes the contents of the box and doesn't cause any movement. The diagram "Mechanics of String Operations"

illustrates these three operations.

STRING. INS and STRING. DEL perform all string movement. Taking advantage of the 8088's built-in string handling instructions, the procedure is paintes and reasonably fast. On computers with slower clock speeds, attempting to move a string whose length is near 64KB will cause a noticeable delay. Although this would be unaceepable in a commercial word processor, the simplicity of the operation is worth the trade-off in a small utility.

The string operations are all designed to take place at the current cursor position, so some means of moving forward and backward through the string is required. The two procedures CURSOR_RIGHT and CURSOR_LEFT satisfy this need. The procedures are nested in the assembly listing to take advantage of common code.

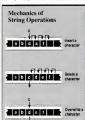
Making these routines modular greatly reduces the code size. The Backspace operation can be divided into two suboperations: move the cursor left, then delete the character at the cursor. The Home key simply calls CURSOR_LEFT until it runs out of string. Other complex operations are built from smaller, modular actions.

The string block is at the end of the COM file, after executable Code. A oneword variable, COM_PTR, keeps track of the length of the file in bytes, including strings. Any editor operation that changes the length of the strings causes a corresponding change in the COM_PTR. If, after editing, ASPINNIEW. COM is written to disk, COM_PTR will be used to determine its length.

Although editing the strings is easy on the assembly code level, it would be a tough job for the user if the strings weren't visible. Displaying the strings requires using pointers, relative addressing, and the concept of the virtual window.

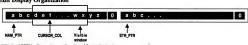
When ASPRN loads, it checks the vidco hardware to find out the current screat state. The most important thing it looks for is the number of columns available on the screen. To work, the screen must be at least ten characters wide. This is certainly the normal situation for most text modes. When the screen width has been established, the edit window is drawn.

Several pointers are maintained to keep track of what is on the screen and where. (See the diagram "Edit Display Organization.") First, NAM_PTR and STR_PTR



Working with strings at the character level involves three basic functions: insert, delete, and replace. The mechanics of these operations are illustrated above.





With the ASPRN editor, only a small portion of the total string in memory may be visible at any one time. That portion is said to appear in the visible window. The screen cursor can be positioned anywhere within the visible window.

ASPRN BY MODEM

the programs published in PC Magazine can be downloaded by modern from the PC Magazine Interactive Reader Service. There is no charge for this service, but users are cautioned that these programs are copyright material and are made available only for individual, noncommercial use. You may make copies for others (including placement on noncommercial electronic bulletin boards), as long as no charge is involved. Making copies for any commercial purpose, however, is strictly prohibited.

The Eastern modern number for PC-1Rs is (212) 69-6306. In the West, call (415) 598-9100. Set your modern and communications software to use 24001 200/300 bps, 8 data bits, 1 stop bits no particle of the position of the pos

If you use the Xmodem protocol, you can download ASPRN COM directly, saving typing or downloading either the .BAS or the .ASM version, ASPRN.BAS, whether entered from the magazine at your keyboard or downloaded from PC-IRS, will automatically create ASPRN.COM when run once in BASIC. ASPRN. ASM, also listed both here and on PC-IRS, allows you to modify the program, but requires you to use a macro assembler (IBM or Microsoft, Version 2 or later) and the following commands:

MASM ASPRN; LINK ASPRN;

EXE2BIN ASPRN ASPRN.COM

Photocopy this page. Trim and hole-punch the copy and add it to your DOS manual.



ASPRN Command

Robert L. Hummel Purpose:

mel 1988 No. 5 (Utilities)

Defines up to 26 user-selected control strings for printer control that are invoked by simple two-character macros in the text.

Format:

ASPRN [/S | /U][/Mx | /Cnnn]

Remarks:

ASPRN is a memory-resident (or TSR) macro processor and editor that intercepts characters on their way to the printer. When it detects a macro-designating character combination—the default is a tilde (--) followed by a letter—it substitutes the user-designated printer control codes.

Example:

The HP LaserJet Series II requires the Escape sequence ESC[4B/Oto cause it to print in portrait mode. Many word processors cannot send the actual ASCII IESC character (027d or 1Bh, designated ESC above), or could not send the trapitred sequence in the middle of a line of text. They could, however, send ~A, to which the user could assign the sequence, and ASPIN would make the substitution.

To create or change the macro assignments, enter ASPRN /S. for each macro, an optional descriptive name and the codes that constitute the macro itself can be entered and edited on the screen, which automatically adapts to any video mode that has ascreen width greater than tien characters. The bottom line of the window defines the various defining levys. The ASCII ESC. ASCII ESC. The control of the property of the position of t

ASPRNNEW.COM, which can either be loaded as such or renamed.

The default macro identifier (the tilde) can be changed by invoking ASPRW with either the VM or the VCmn with. The x is any character that can be entered at the keyboard—for example, the for v symbol. The V forms switch is used to specify characters that have special meaning in DCS. Tous the backspace character (ASCII (DS)) instead of the Hilde for the backspace character (ASCII (DS)) instead of the Hilde for the backspace character (ASCII (DS)) instead of the Hilde for the backspace character (ASCII (DS)) instead of the Hilde for the backspace character (ASCII (DS)) in the V for V (C) options and saving the file will make the change permanent.

Subject to the usual TSR removal limitations, ASPRN can be uninstalled from memory by invoking it with the /U switch on the command line. It should be loaded after any prints poolers and after any printer redirection is made using the MODE command.

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UTILITIES

hold in memory the offset of the character in the current macro name and macro string, respectively, displayed in the leftmost column of the visible window. Initially, that is the same as the first character in each string. The screen cursor row and column are stored in the bytes labeled CURSOR ROW and CURSOR COL. but are collectively referred to by the label CURSOR_POS when convenient. When the editing session begins, the cursor is in the leftmost column of the Name field, and the string pointers are set to the beginning of the strings.

The procedure DISPLAY has the responsibility of placing the right characters at the correct location on-screen. It does this based on one assumption: changes in the string can only occur from the current cursor position forward. A flag, ACTIVE, is kept to indicate which string-the macro name or the macro string-is being edited. When a change is made that requires a screen refresh (inserting or deleting a character or horizontal scrolling), DISPLAY is called.

To find the location in memory of the character at the screen cursor, the offset of the cursor in the window is added to the address of the character at the left side. This operation is performed by the procedure LOCATE_SI. To refresh the screen, characters are then copied from memory to the screen either until there are no more characters left or until the right edge of the window is reached.

MEMORY MANAGEMENT A good portion of ASPRN's code is dedicated to minimizing the amount of RAM occupied when the program is resident. I felt this was important for two reasons. First, I've seen too many commercial TSR programs that perform otherwise useful functions require unforgivably large amounts of memory when resident. They simply become unusable. Second, ASPRN is a dynamic pro-

gram. The block of macro strings may be replaced at any time by loading a modified version of the program. Without good memory management techniques, ASPRN would litter old string blocks throughout RAM. That's both wasteful and technically inelegant.

DOS's memory allocation is based on

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the technique of a linked list of blocks of memory. Each block has a header that describes the block's length and the process that owns it. By tracing the chain of blocks, DOS can perform a rudimentary

check on the reliability of memory. A memory block is divided by creating a new header between two existing headers and linking it into the list by changing the size parameter of the lower header. Similarly, two contiguous blocks may be combined by eliminating the intervening header from the list. This was discussed in these pages in connection with Install Re-

move in our August 1987 issue.

Although it's possible to manipulate the headers directly, it's not really necessary. For all but the most arcane applications, the three services DOS provides to control

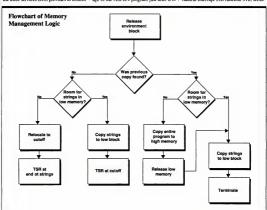
memory are quite sufficient. Under the umhrella of Int 21h, these functions are: 48h—allocate a memory block; 49h—deallocate a memory block; and 4Ah—resize an existing memory block.

The diagram "Flowchart of Memory Management Logic" illustrates the logic of the memory handling. (Although some very good programmers say some bad things about flowcharts from time to time. ASFRN would never have been possible without them.) It has a single purpose: load the macro strings as a contiguous block at the lowest possible memory address.

TERMINATE AND STAY SMALL. The diagram "ASPRN's Major Functional Program Modules" shows a memory image of the ASPRN program just after it is

loaded. Each program loaded by DOS is also given a copy of the current environment in a separate memory block. Since it has no use for this information, ASPRN immediately releases the block so that it may be reallocated.

Next, the tried and true method of seaming memory is used to search for a previously installed expy of ASPRN. If no previous years are season of the procedure FIND.LOW attempts to locate a block of memory of sufficient size at a lower address. If a large enough block is found, the strings are opicio to the new, lower block. If no room is found, ASPRN relocates the strings back down to the area just following block down to the area just following the season is terminated with a call to the old fashful internal 27th function 31th. terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is the dollar program in the call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is terminated with a call to the dollar program is the dollar program in the dollar program is the dollar program in the dollar program in the dollar program is the dollar program in the dollar program in the d



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If, on the other hand, a previous copy is found, he old block of strings is freed so that it may be reallocated. If the old strings had been located at CUTOFF in the previous load, the resident portion of ASPRN is shrunk further to the label MINIMUM. The search for a suitable block in low memory is again performed, and if one is found, the strings are copied and the program terminates, which leaves only the

ASPRN's Major Functional Program Modules

		- High Memor
	STRINGS	
	EDITOR	
	MEMORY MANAGER	
	UNINSTALLER	
	INSTALLER	
	SWITCH IINTERPRETER	— CUTOFF
	TSR LOADER	MINIMUM
	MACRO EXPANDER	Offset 100h
	PSP	- Onset 100n
'		
П		1

When ASPRN is executed by DOS, its image in memory can be represented by the above layout. Each of the modules corresponds to one or more procedures in the source code listing.

strings themselves resident.

Later copies of the program serve no purpose beyond loading the new string blocks, and should therefore leave no code in memory. If room cannot be found in memory that is lower than the current conv of the program, drastic measures are taken: ASPRN reduplicates itself at a higher address, jumps up to that copy, then frees the memory occupied by the code it just left. Since the newly freed memory block was large enough to contain both the strings and the program, the next call to allocate a block large enough for the strings cannot fail. The strings are copied, and the program terminates. In each case when strings are loaded and relocated, the pointer in the

■ Whether you're a laser user or not, the ability to send control strings from inside a document can help to unlock your printer's potential.

memory-resident macro expander is updated to reflect the new location of the strings.

CONCLUSION Whether you're a laser user or not, the ability to send control strings from inside a document can help to unlock your printer's potential. Easy to use and self-contained, ASPRN allows itself to be readily reconfigured to meet your changing needs.

The memory-handling routines used in ASPRN can serve as a model for utilities you would like to write. They also serve as a monument to the primitive tools provided by DOS. Without inside knowledge and undocumented functions, no memory management would be possible. So no matter what your interest, ASPRN is good for what allsy possible.

Robert L. Hummel is senior technical editor of PC Magazine.

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GETTING THE OS/2 THREADS IN HAND



As illustrated by two programs presented here, the multiple threads of execution possible under OS/2 provide better solutions to multitasking than DOS can offer.

s man a multitasking animal? If not, why do we need a multitasking operating system such as OS/2?

With the advent of OS/2, some people are questioning whether multisaking is really useful on single-user personal computers. Certainly we can live without it. But even under DOS—osternshly a single-tasking operating system—users have for oyears wanted the convenience of RAM-resident pop-ups such as SideKick, background printing and communications, and windowing systems such as Quarterdeck's DESQview and Microsoft Windows:

These DOS utilities and operating environments all exhibit at least some of the superficial characteristics of multitasking. They also often have problems related to the single-tasking nature of DOS. For instance, because DOS is not reentrant, a RAM-resident program cannot make a normal DOS call while another program is in the midst of its own DOS call.

Under OS/2, many of the problems asociated with multitasking under DOS disappear. In one sense, every program run under OS/2 is RAM-resident. But what I'll ill ments of this column is OS/2 programs' ability to take a more active role in multitasking, to create multiple threads of execution within a single program.

Let's begin by taking a closer look at the various ways in which multitasking is implemented in OS/2.

TRADITIONAL MULTITASKING A multitasking operating system is one that can run multiple programs "simultaneously." I put that word in quotation marks because there is only one microprocessor in the PC and it can be doing only one thing at a time. The operating system uses a hardware timer interrupt to switch rapidly among the currently running programs. In most cases this happers fast enough that it appears as if the programs are indeed running simultaneously.

Multitasking is common on mainframes and minicomputers principally because those machines must support multiple users. Without multitasking operating systems, the support of multiple users would be impossible.

Mainframe and minicomputer operating systems usually can also run multiple programs associated with a single user. A distinction is made between programs running in the "foreground" (which write to the screen of the user's terminal) and programs running in the "background." The operating systems allow a user to "sub-

 Because DOS is not reentrant, a RAM-resident program cannot make a normal DOS call while another program is in the midst of its own DOS call. mit" jobs to run in the background. Generally, background processing is used mostly by program developers for compilations or for running programs that do not require keyboard input or screen output.

For example, under UNIX a program can be directed to run in the background by appending an ampersand to the command line. If you want to run the UNIX C compiler (called cc) in the background, you run

cc myprog.c >myprog.msg &

The output from the C compiler must be redirected to a file so it doesn't interfere with foreground programs that write to the screen.

BACKGROUND PROCESSING IN OS2.

OS2 is a single-user operating system, so the ability to multitudes is of much less importance than it is on mainframes and mincomputers. As it he case with MIX (and other operating systems for mainrames and mincomputers, OS2 canimars as and mincomputers, OS2 canimars as and mincomputers, OS2 command in with an ampersand, you must preface it with DE-TACH. For example, to nut the MIX of Computer (in a more constitution) of the property of the

DETACH CL MYPROG.C >MYPROG.MSG

The OS/2 DETACH command is certainly handy, but for the most part, the only programs that are suitable for detaching fall into two categories:

Programs like the C compiler that write simple redirectable teletype output. These programs will either not require.

■ ENVIRONMENTS

keyboard input, or they will read standard input through a pipe from another pro-

gram.

2. Programs similar to DOS RAM-resident programs that are designed to run in the background. These programs can get control of the screen and keyboard input by calling the Violopuly function. In earlier Environments programs. ViASEUP (PC calling the Violopul) put the couple of such programs. ViASEUP (PC calling the Violopul) of the calling the Violopul Companion. Violopul Companion V

OS2 SCREEN GROUPS Most popular application programs designed for the PC are highly interactive. It would make no sense at all to use the DETACH command

with these programs.
Instead, OSZ multitasks interactive applications by running them in different
"screen groups." (As I was finishing this
column, we received an early copy of
IBM's retail version of OS/2. The term
"screen group" is not mentioned in IBM's
manual. Instead it refers to multiple "sessions." Same thing, different name, but
I'll ease into IBM's terminology hereafter.)

At any time only one "screen group" is the foreground or current session. The application running in this session can write to the display and read input from the keyboard and mouse.

Programs running in background sessions can continue to run, but they cannot read keyboard and mouse input. If they attempt to write something to the screen, the output is stored in memory and displayed only when the session is switched to the

foreground.

A user switches among different sessions from the keyboard. The Alt-Esc key combination switches between essions discredity. The Clt-Esc keyboard the Clt-Esc keyboa

programs in different windows on the screen.

Most users will find the ability to switch quickly among different programs to be OS/2's greatest advantage over DOS. Human beings may not be multitasking animals, but they are very certainly "contextswitching" animals.

For example, when you're in the middle of a word processing document and you get a phone call about a lunch date, you want to say "Let me check my calendar." You don't want to say "Let me save my document, exit my word processor to get back to DOS, load my calendar, check that date, save my calendar file, exit the calendar program to get back to DOS, load my word processor, load the document I

 Human beings may not be multitasking animals, but they are very certainly

"context-switching" animals.

was working on, and try to figure out where I was when you interrupted my work."

ACTIVE VS. PASSIVE MULTITASKING Of course, we've become rather jaded about multitaking in recent years. RAMresident pop-ups under DOS have given us the ability to switch rapidly among programs. Many large DOS applications include an option to "shell out to DOS" and run another program without leaving the current program.

We've also become accustomed to several windowing environments for DOS that multitask existing DOS applications. But in these systems, multitasking is a passive process from the perspective of the application program. We say that the various programs running under the system 'are multitasked by' the operating environ-

ment.
Under OS/2 a program can take a more active role in multitasking by running two

or more sections of a program at the same time. The sections that run simultaneously are known as "threads of execution." The ability of an OS/2 program to create multiple threads is one feature that makes OS/2 much more powerful and flexible than DOS. Multitasking becomes a tool of the programmer to make more efficient use of

PROGRAMS AND PROCESSES In discussions of OS/2 you'll often come across the word process. Eventually you come to realize that a process is very similar to the thing we used to call a program.

time.

But they're not exactly the same.

A program is an .EXE file or a group of related .EXE files. When an .EXE file is loaded into memory and begins execution, it becomes a process.

Suppose you have a spreadsheet program written for OS/2. You execute that program from the OS/2 command line. The spreadsheet program runs as a process. You switch to another session and run the same spreadsheet program again while the first is still running. One program—two different processes.

Another distinction: some programs can include several. EXE files. The parent process (one of the .EXE files) executes child processes (other .EXE files) to carry out specific tasks. All the .EXE files taken together constitute the program. But each

EXE file running under OS2 is a process. A process owns resources. When a process opens a file, that open file is private to the process. When a process allocates a block of memory, that memory block belongs to the process. A process allocates when the queues and semaphores in opens. These queues and semaphore is opens. These queues and semaphore can then be shared among processes and are often used for interprocess communication.

Under OS/2, each process has its own current disk drive and subdirectory. For example, when a process calls the OS/2 DosSelectDisk function to change the current disk or calls DosChdir to change the current directory, the current disk or directory is changed only for that process and not for any other process. This is in shape contrast to DOS, where there is only one systemwide current disk and subdirectory structure.

Each process running under OS/2 is as-















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signed a "process ID" (abbreviated as PID) when the process begins execution. These process IDs are simply numbers that OS/2 assigns sequentially. A program can determine its own process ID by calling the DosGetPid function. The process ID is also stored in the process's Local Information Segment, the address of which is available from DosGetInfoSeg.

THREADS WITHIN PROCESSES A process running under OS/2 can have one or more "threads of execution." When OS/2 multitasks, it does not switch between processes; it switches between threads. When a process has more than one

thread, the threads run concurrently. When a process begins execution, it has only one thread, often called the "main thread" or the "parent thread." This thread can then start up other threads by calling the OS/2 DosCreateThread function. (We'll be doing this shortly.)

I said earlier that a process owns resources, such as open files, memory blocks, semanhores, and queues. All the threads within a process share the process's resources. For example, if one thread in a process allocates a block of memory, then that memory block is available to all the other threads in the process. The same goes for open files, queues, and semaphores.

Each thread has its own 80286 microprocessor state (that is, contents of the

 A process running under OS/2 can have one or more "threads of execution "

80286 registers that are unique to the thread), its own 80287 math coprocessor state, and its own stack. Just as each process has a process ID,

each thread has a thread ID (abbreviated TID). The thread ID identifies the thread within the process. The TID of a process's main thread is always 1. A thread can obtain its thread ID using the same two func-

tions used for obtaining the process ID-DosGetPid and DosGetInfoSeg. If two different threads in the same process call DosGetPid, the threads get back the same process ID but different thread IDs. OS/2 has a limit on the total systemwide number of threads that can be run-

 OS/2's limit on the total systemwide number of threads that can be running at any time is 255.

ning at any time. By default, this limit is 64, but it can be changed to anything between 32 and 255 by the THREADS statement in the CONFIG SYS file.

SAMPLE TWO-THREAD PROGRAM There are only three thread-specific OS/2 functions-DosCreateThread. DosSuspendThread, and DosResumeThread. Let's look at a sample program called XTYPE.C (see Figure 1) that uses all three

(Note: As I write this column, in late November, I'm still using Microsoft's beta-version OS/2 Software Development Kit. not the lower-cost OS/2 Software Development Kit expected shortly. It is possible, therefore, that XTYPE C will require some changes to compile it under the later OS/2 Software Development Kit.)

of these functions

XTYPE is a simple substitute for the OS/2 TYPE command, though unlike the OS/2 version of TYPE, it does not allow you to enter a whole series of filenames to be typed successively. You run XTYPE by executing

XTYPE filespec

XTYPE displays the file on the screen. While the file is being displayed, you can press any key (not just Pause or Ctrl-S) to stop and then resume the listing of the file. The stopping and starting are handled by a second thread.

A program that creates a second thread of execution-XTYPE, for instancemust include a function (named Thread-





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```
ETTPE.C--Demonstrates multiple threads of execution in 08/2
(C) 1988, Siff-Devis Communications Company
FC Magazine * Programmed by Charles Petsold, 11/87
finclude <doacells.h>
finclude <aubcalls.h>
void far KeyWetchThread (void) ;
main (argo, argv)
     int argo;
char *argv [];
unsigned char ThreedStack [1824];
char far *Buffer;
      unsigned int Handle, Action, Selector,
                      ThreadID, ByteaRead, BytesWritten ;
      if (argo < 2)
           puts ("Syntax: ETTPE filename") ;
           return 1 ;
      if (DOSCREATETHREAD (KeyWetchThread, &ThreadID, ThreedStack + 1824))
           puts ("XTYPE: Could not creete thread") ;
            return 1;
      if (DOSALLOCSEG (65535, &Selector, 8))
           puts ("ETTPE: Cannot ellocate memory for buffer") :
           return 1 :
     Buffer = (char far *) ((long) Selector << 16) ;
      if (DOSOFEN (argy [1], &Sandle, &Action, SL, S, 1, Sx2S, SL))
           puts ("XTYPE: File not found or cannot be opened") ;
                      EG (Selector) ;
           return # :
     DOSREAD (Hendle, Suffer, 65535, &BytesReed) ;
     while (ByteaRead > 8)
           DOSMRITE (1, Suffer, SytesRead, &SytesWritten) ;
           DOSREAD (Sandle, Buffer, 65535, &ByteaRead) ;
       OSCLOSE (Handle) ;
OSFREESEG (Selector) ;
      return 8 :
void far ReyNetchThread ()
      struct KeyDete kd ;
      while (1)
           KEDCHARIN (&kd, 8, 8);
DOMESTSPENDTHREAD (1);
            KEDCHARIN (4kd, 0, 0) ;
                 ESUMETHREAD (1) :
      ,
```

Function, for example) defined as follows:

void far ThreadFunction (void); The two "void" keywords indicate that

The two "vota keywords indicate that the function takes no parameters and returns no parameters. The "far" keyword indicates that the address of the function is treated as a far address with both a segment and an offset. In XTYPE, this function is named KeyWatchThread.

A program can start up that function as a second thread of execution by calling the DosCreateThread function:

DosCresteThread (ThreadFunction, &ThreadID, &ThreadStack) ;

[The above is a single line of code.—Ed.] The first parameter is the far address of the thread function. The second parameter is a 16-bit integer that will receive the thread 1D of the new thread. The last parameter is a pointer to the top of the thread's stack. Each thread must have its own stack. The easiest way to allocate space for a thread's stack is with an array, as shown in X-TYPE.C.

If the DosCreateThread call is successful, then the code in the thread function runs simultaneously with the rest of the process.

In XTYPE, the main thread does everything we would expect in a program that emulated the TYPE command. It reads the file indicated on the command line using DosRead and displays it to standard input with DosWrite. The reading and writing uses a 65.535-byte buffer to make it as fast as possible.

The second thread—which is the code in the KeyWatchThread function—waits for a keystroke by calling kbdCharln. When kbdCharln returns, indicating a key has been pressed, the function calls

DosSuspendThread (1);

The parameter of DosSuspendThread is the thread ID of the thread to be suspended. A parameter of 1 indicates the process's main thread, which is the code in XTYPE's main function. When the KeyWatchThread function reads a second keystroke, it allows thread 1 to continue by calling

DosResumeThread (1);
This is how the second thread of execution

Figure 1: XTYPE is similar to the TYPE command except that it uses a second thread of execution to stop and resume the listing when any key is pressed.

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stops and resumes the first thread when keys are pressed. The while statement in KeyWatchThread causes the code to run "forever." The thread is actually terminated when the main thread ends.

Notice that XTYPE's main thread spends most of its time in the middle of the DosWrite call, which writes the contents of the file to standard output. It may also spend some time in the DosRead function if the file is being read from a diskette or a slow hard disk. Even if the main thread is in the middle of one of these function calls, DosSuspendThread and DosResume-Thread are still able to suspend and resume the thread.

But doesn't the second thread of XTYPE slow down the first thread? No, it does not. As I pointed out in an earlier Environments column (PC Magazine, FebruKbdCharln with the no-wait flag set to 0 is not allocated any time slices if a keystroke is not available. The main thread of XTYPE runs just as fast as it would if the process had not created a second thread.

Moreover, when the first thread is suspended and the second thread calls KbdCharln again, neither of the two threads is allocated any time slices. Everything else running under OS/2 proceeds at a speed as if XTYPE were not even there.

DOING IT UNDER DOS Of course. XTYPE is a trivial program and you can easily duplicate it under DOS. Or can you? Let's think about that.

One way to program XTYPE for DOS is to read from the file and write to the screen using very small buffer sizes. You can then check to see if a key has been

```
ous problem with this code-because it
reads from the file and writes to the screen
with a small buffer size, it will run much
more slowly than the OS/2 XTYPE pro-
gram.
  Another solution under DOS is to trap
Interrupt 9h. When you get a keystroke,
you remove the key from the keyboard
hardware, set a flag, reenable interrupts,
```

screen. Figure 2 shows some DOS code

that uses the normal C library functions

read, write, kbhit, and getch with

a buffer size of 32 bytes. But there's a seri-

and go into a dead loop checking the flag. This stops the rest of the system (except hardware interrupts) from functioning. When you get another keystroke, you reset the flag and exit the loop. (You can probably steal the Pause key code from the PC BIOS if the logic involved with this is initially a little obscure.) So, yes-it is possible to write XTYPE

for DOS. But I think it's clear that the use of multiple threads under OS/2 is more efficient and cleaner than the DOS alternatives.

ANOTHER EXAMPLE A number of DOS application programs display the current time on the screen while the program is running. How do they do this? Under DOS you again have basically two methods, neither of which is entirely satisfactory

The first method involves updating the time when no keystrokes are available. The code example in Figure 3 shows one possible solution, using the C ftime function. The ftime function takes a pointer to a structure of type timeb. The time field of this structure contains the clapsed time in seconds since January 1, 1970.

Your program would call this GetKey function whenever it wanted to read a keystroke. GetKey gets the current time, checks it against a saved value, and updates the time display (by calling DisplayNewTime) when the two values are different This code would be a real pig under a multitasking environment because it would spend an inordinate amount of time calling and recalling ftime when all it

should be doing is waiting for a keystroke. The second DOS solution is to intercept Interrupt 8h or 1Ch. This lets your pro-

```
ary 16, 1988), a thread that calls
                               pressed before writing each buffer to the
 BytesRead = read(Handle.SmallBuffer.32):
 while (BytesRead > 0)
     if (kbhit ())
                                  /* get "suspend" key */
              getch ();
              getch () ;
                                  /* get "resume" kev */
     write (1, SmallBuffer, BytesRead) ;
     BytesRead = read(Handle, SmallBuffer, 32);
```

Figure 2: A code fragment that shows how the XTYPE program in Figure 1 could be approximated under DOS.

```
GetKev ()
     static struct timeb CurrentTime, LastTime :
     while (1kbhit ())
          ftime (&CurrentTime) ;
          if (CurrentTime.time (= LastTime.time)
                                    DisplayNewTime (&CurrentTime) ;
               LastTime = CurrentTime ;
     return getch () ;
```

Figure 3: This code fragment shows a simple-minded approach to displaying the time on-screen while waiting for a keystroke.



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gram check the current time every 55 milliseconds. Remember—don't make a DOS call to check the time or you'll have problems with reentrancy! The SHOW-TIME.C program in Figure 4 shows the OS/2 solution using multiple threads.

The ShowTimeThread function in SHOWTIME calls boxSleep with a parameter of 1000. This function does not return until 1,000 milisec onds have elapsed. During that time, the thread does not get any time slices, and other threads in the process continue to run at normal speed. When DosSleep returns, the function uses DosGetDateTime and VioWrt-CharStr to display the time in the upper-right-hand come of the screen.

The main thread of SHOWTIME sim-

ply calls KbdCharfn and terminates the program when a key is pressed. In a real program the main thread would be doing other work while Show Time Thread kept the call which of indicated. If the main the call wishes the displaced in the call wishes the call wishes the calling box Supperful Pread, It has the thread ID from the initial Dos-Create Thread function call calling the Supperful Pread, It has the thread ID from the initial Dos-Create Thread function call

Once again, the creation of a second thread of execution provides a simple and structured solution to a job that is somewhat awkward under DOS.

INPUT FROM MULTIPLE SOURCES Multiple execution threads are highly recommended in programs that must obtain

```
    A program that uses
both keyboard and mouse
input should have at least
two threads of execution.
```

input from more than one source. The use of multiple threads ensures that the process does not eat up time slices when it is not doing anything except waiting.

Service of the committee of the committe

Another type of application that must deal with multiple input sources is a communications program. Communications programs must read input from both the keyboard and the serial port. Many DOS communications programs alternate between checking if a keystrote is available and checking if serial port input is available. That approach is not recommended under OS/2 because it east up time slices when there is no input from either source.

when there is no input from multiple When dealing with input from multiple sources, I think we can derive a simple rule for OS'2 programming: When a thread is not working, it should be sleeping. A thread 'sleepe' when it does not use any time slices, as when the thread is suspenddor when it is in the middle of functions like DosSleep, KbdCharln, and Mou-ReadEven(Que.

This leads to an interesting observation. You might initially assime that the speed of OS/2 depends on how many threads are present—the more threads, the slower the system. But I think the examples shown here illustrate how programs can create multiple threads of execution to allow the system to run faster than would otherwise bopossible.

```
SHOWTHE.C.—Displays current time from second thread in OS/2
(C) 1988, Elff-Davis Communications Company
PC Magasine * Programmed by Charles Petsold, 11/87
void far showTimeThread (void) (
     unsigned thar ThreadStack [1924];
unsigned int ThreadID;
etruct KeyData kd;
                                  wrimethread, athreadID, ThreadStack + 1824))
           pute ("SHOWTIME: Could not create thread") ;
           return 1 ;
      KEDCHARIN (&kd, 0, 0) ;
      return # :
void for ShowTimeThread ()
                      buffer [10] )
      struct DateTime dt
      md.length = sicoof (md) ;
      VIOGETHOOR (&md, 8)
            (1)
            DOSSLEEP (1886L) J.
                   DATETINE (&dt) ;
            eprintf (buffer, "42d:402d:402d", dt.hour,
                    HARSTR (buffer, 6, 8, md.col - 6, 8) ;
```

Figure 4: SHOWTIME demonstrates how a second thread of execution can display the current time in an application program.

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Understanding C Functions: Scanf



While many C functions are relatively easy to duplicate with MASM routines, coding the powerful scanf function would be an assembly language programmer's nightmare.

In the last two columns, we've gone over the primitive C functions that convert ASCII strings to himry values and vice versa. We have also developed some assembly language procedures (ITOA, ATOI, and ATOI, that allow you to perform the same sorts of conversion operations in MASM programs.

Assembly language programmers, who regard procedures such as ATOII and TIOA as vital building blocks, may be surjected to find that C programmers are not yeaguely aware of the counterpart C functions—if they even know such C functions exist at all. Why? Because C includes a much higher-level family of versalitie input conversion and output formatting functions, exemplified by see and printf, that meet almost every applications program requirement.

In this column, we'll take a brief look at the powerful a card functions. Near of functions we'll the show how he two families can be used together in C programs. In the process, perhaps I can remove a bit of the mystery that newcomers to C find surrounds these functions and at the same time give MASM programmers something and challenging. Writing full MSM equivalents for scan f and printf would certainly occupy a few tile hours.

INPUT CONVERSION IN C The prototype C function for performing keyboard input and conversion is scanf, which is used in the form The arguments for a canf are the address of a "format string" and pointers to one or more variables. Sc anf reads characters from the standard input device (atd.in). This is normally the keybourd unless the program's input has been redirected to a file or another character device. Sc anf performs any necessary conversion according to the contents of the format string and stores the results into the specified variables.

Scan ruses white space (blanks, tabs, or new-line characters) to delimit fields in the input stream, and it can perform multiple conversions of the same or different types from a single function call. The "value" of the scan af function is the number of fields that were converted and assigned to variables, or the magic value EOFI finput was redirected to a file and the end of file was reached.

The contents of the format string are the key to the use of scanf. The string can consist of three basic elements:

 white space (any combination of blank or tab characters, or a new-line char-

(2) non-white-space characters, other than a percent sign (%), that don't occur in a field starting with a percent sign;

(3) a format specification, which is a white-space delimited field that always starts with a percent sign (%) character, followed by other characters that indicate data types and field widths.

Each of these types of format string causes scan f to take a different action on the characters it obtains from the standard input device. When scanf finds white space in the format string, it looks for and discards any amount, including zero, of white space in the input character stream.

Non-white-space characters in the for-

Data Types Recognized by Scanf

Type character	Type of input expected
d or D	Decimal integer
o or O	Octal integer
x or X	Hexadecimal integer
iorl	Decimal, octal, or hexadecimal integer
u or U	Unsigned decimal integer
e, E, f, g, or G	Floating-point value
c	Single character
•	String (one or more characters)
Р	Pointer in the form segment offset

Some of the data types recognized by the scanf function in Microsoft C, Version 5.0. The types in this list are a superset of the types specified in the draft ANSI C standard.

■ POWER PROGRAMMING

mat string, other than those that occur in a format specification, are regarded by scanf as mandatory pattern that must be matched by the input stream. Matching characters are discarded, if a nonmatching character is encountered in the input, scanf simply terminates and any subsequent format specifications in the format string are not processed.

When scan f encounters a format specification in the format string, it attempts to convert the next field in the input rearrant secording to that specification. The second second second second second second white space; that is, scan f starts reading white space; that is, scan f starts reading space if any, and then processes the field until it again encounters a white-space character. If the convention is successful, and the second second second character. If the convention is successful, the second second second specification consists of several mutually dependent subfields and takes the form

%[*][width][F|N][h|1]type

The type is a single character that specifies the type of input expected and controls its conversion (see the table "Data Types Recognized by Scarn"). The width sub-field is a positive integer that controls the maximum number of characters in the field read from the standard input. The optional F or N modifiers indicate that the corresponding pointer in the argument list

ASCII Floating-Point Number Field Variables

Variables		Definition	
w	-	White space (any combination of blanks and tabs)	
sign	-	A "+" or "-" character	
digits	•	Some combination of the characters "0" through "9"	
E	-	Exponent delimiter, one of the charac- ters "e" or "E"	

Scanf and Related Functions

scanf	Accepts pointers to a format string and one or more variables.
	Reads from the standard input, converts fields according to the supplied format string, and places the resulting values in the
	variables.
cscanf	Like scanf, but always takes its input from the console
	regardless of any redirection that may be in effect.
fscanf	Like $s can f_*$ but takes its input from the specified file or device.
sscanf	Like scanf, but converts the contents of a supplied string, rather
	than obtaining its input from a file or device.

refers to a Far or Near data object, respectively, while the 1 or h modifiers indicate that the data object is long or short. Finally, the presence of an asterisk (*) in the format specification causes the corresponding field in the input to be scanned but not assigned to a variable.

USING SCANF As a simple example, consider the statements

int x,status;
status = scanf("%d", &x);

In this case, north will read the next field from the standard input device and attempt to convert in to a decimal integer. If the conversion is successful, the result is a value of I that is useligated to the variable santus. If the conversion fails for any reason tea's the would, for example, if the field obtained from the standard input cortained characters often than the digits of through 91, the value of I is undefined, the value resulted by a cast and and assigned to status is the conversion of the value of the conversion of the value of the value of I is undefined, the value resulted by a cast and and assigned to status is the value of I is undefined, the value result of the value of I is undefined, the value of I is undefined to status is the value of I is undefined to the value of I is

For a somewhat more complex example, consider the sequence

int status; double fver1,fver2; status = scanf("180f 981f", 6fver1, 6fver2);

In this example, the format string specifies that the first field to be read from the standard input should not exceed ten characters in length and should be converted to a stored in the variable fyar1. The second field read from the standard input may not be longer than eight characters, should be converted to a long floating-point number, and should be placed in fyar2. Scanf expects the ASCII field representing a floating-point number to take the form

[w][sign][digits][.digits][E][sign][digits] In this schema each field in square brackets

is optional and is defined in the table "AS-CII Floating-Point Number Field Variables."

Note that, unlike the primitive function a tof discussed in an earlier issue (which

 When scanf finds a format specification, it attempts to convert the next field according to that specification.

converts an ASCII string to a binary floating-point value), scanf does not accept the letters "d" or "D" as alternatives to "e" or "E" when specifying an exponent.

A WORD TO THE WISE By now you may have noticed the principal danger (and most common bug) in the use of scanf.

The scanf function has no way to tell

whether the variables to which it has been passed pointers are the right type or large enough for the data that they will be receiving. For that matter, since it accepts a variable-length list of arguments, it can't even tell if you haven't passed enough pointers to match the format specifications within the format strine.

If you pass scanf a bogus pointer, or a pointer to the wrong kind of variable, scanf will cheerfully do its job, but your program will probably crash or exhibit bizarre behavior at some later point in its execution. A particularly characteristic type of crash is encountered when a routine calls scanf with pointers to automatic variables (that is, variables that are allocated on the stack) of the wrong type. Since the caller's own return address is sitting right above the automatic variables, in a perfect position to be bashed by scanf. the horrid event occurs. It doesn't happen during the call to scanf-that would be too obvious-but rather when the calling routine finally winds down to its own last little curly bracket. A heavy sigh and the long reach for the Big Red Switch are the most common consequences of this programming error.

problems with a routine that calls scanf,

If you pass scanf a bogus pointer, it will do its job but your program will probably crash.

use static variables until the bug is isolated, to help stabilize the system and reduce the number of possible interactions between scanf and its caller.

SCANF ESOTERICA The format string that is fed to scan f need not be static itself (that is, completely predetermined at compile time). The ingenious programmer can use the powerful C string functions such as strcat, strspn, and strst to build up format strings dynamically and then pass a pointer to the constructed string to

scan f. A good example of this would be a program that would configure its input routines at runtime to reflect the number of rows and columns available on the video

display.

The scanf function also has some cousins that are useful in special situations (see the table "Scanf and Related Functions"). These related functions work in the same general way but take their input from a file or ASCIIZ string. Once you've

 Once you've mastered scanf, you will have no problem with its moresophisticated relatives.

mastered the basic scanf, though, you will have no problem with its more-sophisticated relatives. You will find scanf especially helpful in application programs because it allows you to validate input fields before trying to convert them.

There are may subtle points associated with the earn from string that haven't covered in this brief overview. After two very least the fraction at the fraction at lines one test-bed programs. I recommend that you turn to the nutrine library manufact or your Compiler and read the scan frenty or your Compiler and read the scan ferry programs. I would be scan for the carefully. In typical compact but cryptic C fashion, you will be amazed at the amount of functionality you can cram into it for functionality you can cram into a for functionality you can cram into a for functionality would be supported to the program of the compiler of

THE IN-BOX Comments and suggestions about this column from PC readers are welcome! You can contact me by the following e-mail routes: BIX: rduncan

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SPREADSHEET CLINIC



Providing 1-2-3 with a learn mode for recording macros; an anomaly in /File Xtract file handling; mimicking SuperCalc's suspend command.

A LEARN MODE FOR 1-2-3

When J-2-3, Release 2, was introduced in late 1985, I found it hard to believe that Lotus didn't include a macro "learn" mode, since the concurrent release of Symphory had one. To remedy this shortcoming, I designed the keystroke-recording macro shown in Figure 1. Even though Lotus recently released a macro-recording add-in for J-2-3, I thought your readers might like to see my macro and understand how it works.

The first two statements in the macro enter null labels into the cells named LINE1 and LINE2-the cells in which 1-2-3 will record your keystrokes. The next statement, LOOPI, causes the macro to pause until you press a key. When you do, 1-2-3 records the representation of that key in the cell named KEY. The next statement in the macro copies the keystroke representation from KEY into the cell named ENTRY I-the next cell in the macro. When 1-2-3 executes ENTRY1. therefore, it does whatever the key you pressed would normally command it to do. Thus, the macro both records the keystroke and passes it on to 1-2-3.

The next statement in the macro tests to see whether LINE1 already contains more so we whether LINE1 already contains more many contains the seed of the macro. If not, 1-23 executes the seventh statement in the macro, which appends the key representation currently storted in KEY to the keystrokes (if any) currently in LINE1. Next, 1-2-3 loops the macro back to LOOP! (the third statement in the macro) and records your rook keystrokes.

1-23 will continue in this fashion until LINEI contains more than 230 characters. At that point, the macro branches to the second part of the macro, which begins with the statement named NEXT. This part of the macro creotry sour keystrokes in the cell named LINE2 in the same way the first part of the macro captures them in cell LINEI. 1-23- will continue to add desyntokes to LINE2 until it contains more cell cannot be contained to the contained to the cell cannot be contained to the contained to the cell cannot be contained to the contained to the cell cannot be cell cannot be cell to the cell cannot be cell cannot be contained to the cell cannot be cell to the cell cannot be cell cannot cannot be cell cannot be cell to the cell cannot be cell cannot cannot be cell cannot cannot be cell to the cell cannot cannot be cell cannot cann

After you have stopped recording, you

can use the /Copy command to copy the contents of LINE1 and LINE2 to an empty portion of the worksheet, then assign a macro range name to the first line. Alternatively, you can copy the contents of those lines into an existing macro. In either case, 1-2-3 will play the keystrokes just as if you had you them manually.

Although I've limited this macro to capturing a maximum of 460 characters, you can expand it if you wish. To do this, add a LINE3, LINE4, and so forth, and create new parts of the macro to enter keystrokes onto those new lines.

Mark Tharp Springfield, Missouri

```
11
                   {Let LINE1, ""}
                   {Let LINE2, ""}
LOOP1
                   {Get KEY}
                   (Let ENTRY1, KEY)
ENTRY1
                   (If @LENGTH(LINE1)>23@) (Branch NEXT)
                   (Let LINE1, LINE1&ENTRY1)
                   (Branch LOOP1)
NEXT
                   {Let LINE2, KEY}
LOOP 2
                   (Get KEY)
                   (Let ENTRY2, KEY)
ENTRY2
                   {Let LINE2, LINE2&ENTRY2}
                   (If @LENGTH(LINE2)>230) (Quit)
                   (Branch LOOP2)
KEY
```

Figure 1: This macro records macro representations of the keys you type.

TITNE1

LINE2

■ SPREADSHEET CLINIC

What can we say? This macro lets anyone who uses Releases 2 or 2.01 of 1-2-3 record his macros. It does nearly as good a job as Lotus's Learn add-in and uses a lot less memory.

/FILE XTRACT MYSTERY

If you use the File Xiract command in 12-3 to extract information from a work-sheet, then use the File Retrieve command to retrieve the file in which you shored the information; the extract will appear in the tell file bower to the file however, the information is stored in the same "cells" as it was in the source worksheet. If you want to combine only part of the information from the extracted life, therefore, you must reference that information according to the location it occupied in the worksheet from which he was uppead in the worksheet from which he was the first than the worksheet from which he was the worksheet fro

Suppose, for example, that you used the /File Xtract command to extract the values from cells C2...C4 of the worksheet shown in Figure 2 into a file named TEMP.WK1. If you then used the /File Retrieve command to retrieve this file, 1-2-3 would place the value 4 into cell A1. the value 5 into cell A2, and the value 6 into cell A3. If you used the /File Combine Copy Named/Specified-Range command and specified cells A1, A2, or A3, however. 1-2-3 would combine zeros into the worksheet. To bring in the value 4, you would have to specify cell C4; to bring in the value 5, you would have to specify cell C3; and to bring in the value 6, you would have to specify cell C4.

Be aware of this difference between the actions of the /File Retrieve and /File Combine commands on files that were created using the /File Xtract command.

J. W. Edmondson Winnipeg, Manitoba Canada

Mr. Edimonaton is correct. Apparently, the Mr. Red monaton is correct. Apparently, when the cast a correct of a worksheet, the extracted first indeed entirely contained for cells, in the cast contained first they occur in the cast of the cast contained worksheet. To combine the entire is made worksheet worksheet in the forest on up to the coordinates of the contained for the cast of the

	A	В	С	D
1		PERIOD 1	PERIOD 2	PERIOD 3
2	ITEM 1	1	4	7
3	ITEM 2	2	5	8
4	ITEM 3	3	6	9

Figure 2: When 1-2-3 extracts entries from a worksheet, it stores those entries in the same cells that they occupied in that worksheet.

SUSPEND {Get KEY} {If KEY<>-(TABLE)*){KEY}{Branch SUSPEND}
KEY

Figure 3: This macro routine gives 1-2-3 the effect of SuperCalc4's {suspend} command.

place the information at the upper-left coruer of the worksheet—not in the cells that the information occupied in the original worksheet.

PAUSING MACROS

In the November 10, 1987 Spreadsheet Clinic, you published a letter explaining how SuperCalc4's {suspend} command pauses a macro until a user presses the F8

 This macro does nearly as good a job as Lotus's Learn add-in and uses a lot less memory.

key. During the pause, the user can do anything from the keyboard that he can do outside the context of a macro.

1-2-3 does not offer a {suspend} com mand. However, you can use the macrosubroutine shown in Figure 3 to achieve the same effect. You can pause a macro while the user does work within 1-2-3 by usine the subroutine call (SUSPEND).

The first statement in this subroutine causes the macro to pause until you press any key. When you do, 1-2-3 stores the macro representation of that key in the cell named KEY. After doing so, 1-2-3 will test to see if KEY contains the label '[TA-BLE]—the macro representation of the F8 key. If it does not, 1-2-3 will execute the

subroutine call {KEY}, which "passes" the key on to 1-2-3. Then it will execute the command {Branch SUSPEND}, which routes the execution of the macro back to the top of the subroutine, at which point 1-2-3 waits for you to press another key.

1-2-3 will continue to capture, test, and then pass on your keystrokes until you press the F8 key. At that point, 1-2-3 skips the next line of the subroutine, which is blank. Consequently, it will return to the macro that called the SUSPEND subrou-

Since the F8 key ends SuperCalc's {suspend} command, I used that as the "trigger" key for this routine. However, you could use any other key simply by substituting the representation of that key for the representation of the F8 key in the second line of the subroutine.

Barbara Wells Louisville, Kentucky

This subroutine does a good job of emulating SuperCalc's {suspend} command. Since 1-2-3 tests every key as you press it, however, you may notice a slight delay as you are working within this subroutine.

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User-to-user

A printer utility for the popular CARDFILE pop-up dialer; longer MORE and EDLIN displays; and a security warning for mouse owners.

PROSISE ON PROSISE

Several readers have written in recent weeks asking for more details concerning the internal file format used in the pop-up CARDFILE utility presented in the Utilities column of Cotober 13,1987, and for a companion program to output name, address, and phone files to the printer. The program's somewhat unusual method of soring ASCII data without end-of-line markers thwarts conventional methods of reading and interpreting its files.

The file structure is simple: The first

byte in the file holds a binary value that represents the number of records stored (where one card corresponds to one record), and thereafter lies the ASCII text of the cards themselves. Each record is composed of six 32-byte lines. There are no carriage returns, instead, each line is delimited by its known 32-byte length. Thus, a file created by CARDFILE consists of a single-byte value followed by groups of text 192 bytes in length.

Figure 1 provides an assembly language listing of CFPRINT.COM, a short utility designed to read CARDFILE data stored on disk and route it to your printer. The syntax for the program is

CFPRINT filename

where "filename" names the data file to be printed. A drive and path designator may also be included.

Output is routed by default to LPT1, by virtue of a zero byte at offset 0103h inside the COM file. To alter the program for other printer ports, simply use DEBUG to change this byte. A value of 0 corresponds

-						
				1007	95. dec (606)	pero line terminator byte
		ROFELE name/address/pho				
i olutes ye.				BOT	hyte ptr de: (bx+01h),4	/ ASCIIS format
CP991	FT filens	ne .		rooms the date file or	escified on the command I	Lne.
			le to be grunted, complete with			
I Apple . Little	trane, 10	the name of the mate II	te te be gristes, complete with	Ber	ex,3088b	jopes with read-only access
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		Communications Co.		nov	de,offeet errneg2	resit if cell feiled
				30	errer_exit	
				207	br.et"	:oave file becdle
Code	84 (0.40	t pare public "code		reand the first byte :	of the file to determine	the number of records.
		cercode, de code				
	44.0	1885				
begins	500	main		101	eh., 39%	;reed one byte
				907	ex.1	
1pt_number	dv		is - LPT1, 1 - LPT3, stc.	nev	byte_coust.1	
Lyte court	dw			NOV	48, 985	
				iet	21h	
stanedj	0	13,10,'We filename ap		nev	dx.offeet errmegl	:exlt en error
erypeg2	65	13,18, Tile set found		50 cea	error exit	
errough	65	13.18. Error reeding		110	ex. byte count	
				310	elibrie etr dairage:	stratefer count to CE
				207	cy-ch	
	2018	teer				
					into memory, beginning 1	
		ter a filenana.				
				0789		
		41,41h				;celculate number of bytes
	Borr	ex.44	: looking for the first	bra2		
	MOY	ai.32	, non-sears character	mor		
	c16		1 managed districted	mine	Tenat, ex	
	rese	acesh		BOY		reed it all with one cell
	con	byte ptr [41-31,13	carror of Add agencytered	Day	dr.effret lest byte	
	ice			IM	216	
	Day	dE.offcet errmsol	idiapley error message and	040	CE	received record count
IZZKe Terre	207	eh.9	WHIT WITH ERRORLEVEL - 1	Bay	dx,effeet errmes)	jesit on error
	Let	21 is		je je	errer_eeit	
	wev	ee,ec@lh		cep	44, 59%- 00005	
	Let	21h		310	errar exit	
eresie:	1000	dis, då	yeave filename offset			
	640	6x		riless the date file.		(connues

Figure 1: CFPRINT ASM to create CFPRINT.COM, a shart utility designed to read CARDFILE data stared on disk and raute it to your printer. The syntax is CFPRINT filename, where filename names the data file to be printed. A drive and path designator may also be included.

USER-TO-USER

	int	ab, 28h 21h			loop pop call	line_loop on orlf	prest line
make sore the	printer	is powered on and coli	ne.		Loop	record_loop	pass record 1555 155
	807	sh, 2 dr, 1pt_number	iget printer states	inuit with a	return co	de of mero signifying e	
	Lat nor test	17h dx.offost orrespt sb.6 error mait	perit if bit 3, the I/o s error indicator, is	mia	ist endp	21h	Executive - 9
Seep thru each	record,	seeding text to the p	rinter complete with CMLF's.	erlf	pree	neer ex. Peach	tions COCP
	807	ai, offset last byte dr, lpt_number	plnitialise pointer pinitialise printer number	1	ner let	17h en, 605ab	
record_loop+	posh nor	ea, s	16 lines per record		ret	17%	36.38
ine_loop:	poul	98.22	1000 (teretion per line	ew1f	endp		7 TO 1 TO
baracter_loop:	lodeb	0.1	iget one charater	lest_byte	label	hyte	199
	int loop mall	17h character_loop crlf	ploop back for more	code	ends and	bogin	(Figure I ends)

to LPT1, 1 to LPT2, and 2 to LPT3. A DE-BUG script to modify CFPRINT to use a printer configured as LPT2 looks something like this:

DEBUG CFPRINT.COM E 8183 81

W Q The comments included in the listing should make the CPRINT source code easy to follow for those familiar with assembly language and DOS file functions. After passing the command line for a file-pocification, the utility converts text to ASCIIZ format (DOS parlance for a string delimited by a binary zero) by replacing the ASCII 13 terminanor supplied by DOS

with a zero. The file is opened, a byte is read, and a number of 192-byte blocks equal to the value of the first byte is read. With all records residing in memory, each is scanned and sent via BIOS interrupt 17h to the printer.

Note that reading the stack of records from disk is accomplished through a single call to DOS function 3Fh. If there are ten

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records to be recalled, reading 1,920 bytes with one call is more efficient than making ten calls for blocks of 192 bytes.

The PC Lab Notes column of August 1987 unveiled a pair of utilities appropriately naveled a pair of utilities appropriately named INSTALL and REMOVE to help manage memory-resident programs. A number of questions arose concerning their compatibility with commercial utilities such as SideKick and Metro that offer to uninstall themselves.

INSTALL and REMOVE should be full compatible. Its perfectly acceptable, for example, to run INSTALL, load a TSR, load SIDEKICK, let SideKick remove itself from memory, then REMOVE the first TSR. Event SideKick is preceded by its own copy of INSTALL and subsequently eliminated with the Cut-Install control of the sideKick is preceded by the compatibility of the sideKick is good and simply undo the last INSTALL. In short, you should have no reservations about mixing the methods.

The danger with self-removing programs is that if one or more TSRs are load-above them, an intermediate removal will leave a hole in memory and, worse, often corrupt an interrupt vector chain. Leaving a vector dangling and pointing the pointing and pointing the property of the control of the property of the property

Jeff Prosise Knoxville, Tennessee

EGA-AWARE MORE

The DOS MORE filter pauses every 25 inse even though the EGA is capable of displaying more. But it's possible to patch MORE-COM (Version 3.1 or later) to handle this. Just type the EGAMORE SCR script in Figure 2. The addresses in this script are for Version 3.1 only; for Version 3.1 and 3.2, note the slightly different offsets mentioned after the semiconermal control of the control of th

lons on some of the lines.

Type in the sering using a pure ASCII word processor, or EDLIN, or the DOS COPY CON command (and make sure you're entering the right addresses and values for your particular version of DOS). Hit the Enter key after each line, especially the last one with the Q. And be sure to leave the four blank lines; this won't work without them. Then put EGAMORE SCR in the same directory as your DOS MORE. COM and troy.

DEBUG < EGAMORE.SCR The script will create a new DOS-version-

specific copy of MORE.COM called EGAMORE.COM. This patch is useful for EGA systems

This patch is useful for EGA systems because it uses the character generator routine provided by INT 10 to figure out the proper number of rows. The patch codes are located where the "— More —" message was. EGAMORE.COM will beep in-



The Product Market

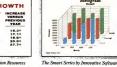
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■ USER-TO-USER

NOP

stead of printing this message. Finally, this patch increases the size of the buffer from 4K to 32K.

Johnny Y. Chin San Jose, California

All utilities should use this technique to sniff out the actual screen size. But, regrettably, few do. Worse, most DOS utilities don't. Shameful. Be sure you don't have ANSI,SYS loaded, by the way, when you try to expand your EGA screen size, since ANSI hard-wires the screen size to 25 lines. You can run the CLSEGA.BAS pro-

gram in Figure 3 to create a file called CLSEGA.COM that will clear an EGA screen to blue text on a 43-row white background. To patch the color once you've created the file, change the byte at address 12A. The left-hand digit represents the background and the right-hand digit the foreground; changing it from the existing 71 to 25 would produce purple text on a green background.

See the following letter for another 43line patch.

N MORE.COM A 112 ruse 114 for DOS 3.1 and 3.2 JMP 1EE jimp to patch code NOP A 1EE ;same for DOS 3.1 and 3.2 MOV AX,1138 tinvoke video BIOS character generator INT 10 ;routine to return information; current

number of rows returns in DL juse [1E7] for DOS 3.1 and 3.2 juse 119 for DOS 3.1 and 3.2 INC DL MOV [1E5],DL JMP 117

A 1BA ;use 1BC for DOS 3.1 and 3.2 JBE 1DC ;use 1DE for DOS 3.1 and 3.2 MOV DL, 7 ; change code to issue beep MOV AH, 2 tinatead of -- Nore --INT 21 NOP

A 1C9 ;use 1CB for DOS 3.1 and 3.2 MOV DL.D send carriage return only MOV AH, 2 ; to save one line INT 21

E 13F 88 ;use 141 for DOS 3.1 and 3.2 N EGAMORE.COM ;increase buffer size to 32K

Figure 2: EGAMORE SCR to patch MORE COM, Versions 3.1 through 3.3, so that it's aware of the actual screen size. Type in the script using a pure-ASCII word processor, EDLIN, or the DOS COPY CON command (and make sure you're entering the right addresses and values for your particular version of DOS). Hit the Enter key after each line, especially the last one with the Q. Aud be sure to leave the four blank lines; this wou't work without them. Then put EGAMORE SCR in EGAMORE.SCR in the same directory as your DOS MORE.COM and type DEBUG < EGAMORE.SCR

188 ' CLSEGA.BAS program to create CLSEGA.COM 118 E=16:CLS:PRINT "Checking DATA; please wait ... "

128 FOR B=1 TO 5:FOR C=1 TO 16:READ A\$:T=T+VAL("6H"+A\$):NEXT 130 READ S:IF S<>T THEN PRINT "ERROR IN LINE"; B*10+180:END 149 T=8:NEXT:RESTORE:OPEN "CLSEGA.CON" AS \$1 LEN=1 150 FIELD #1.1 AS DS:FOR B=1 TO 5:FOR C=1 TO 16:READ AS

168 LSET DS=CHRS(VAL("4H"+AS)):PUT #1:IF B=5 AND C=E THEN 188 178 NEXT: READ F\$: NEXT

188 CLOSE: PRINT "CLSEGA. CON CREATED" 198 DATA B8,12,11,B3,88,CD,18,29,C8,8E,D8,FF,36,87,84,88,1786 288 DATA 8E,87,84,81,89,88,86,84,81,CD,18,8F,86,87,84,BA,1221

218 DATA 84,83,88,14,87,EF,88,88,86,87,71,31,C9,8A,4F,2A,1676 228 DATA CD, 18, 84, 82, 38, FF, 31, D2, CD, 18, CD, 28, 74, 83, C6, 87, 1747 238 DATA 88,A8,67,46,32,86,69,46,22,C5,22,C1,74,83,C6,87,1346

Figure 3: CLSEGA.BAS program to create CLSEGA.COM, which will clear an EGA screen to blue text on a 43-row white background. To patch the color once you've created the file, change the byte at address 12A.

LONGER EDLIN DISPLAYS

The EDLIN P (Page) command displays just 23 lines when entered without arguments. By changing the line count byte, it's possible to have EDLIN display any number of lines from 1 to 128. I've altered

the P command to display 41 lines when I use EDLIN in the EGA's 43-line mode. This patch affects the P command only.

The address of the line count byte varies according to the DOS version:

Version	Offset
2.0	700
2.1	700
3.0	102B
3.1	105C
3.2	105C
3.3	105C

The default value at this address is 16. since this is part of the instruction:

ADD DX.+16

No. of lines

The value of this byte cannot exceed 7Fh (unless you want your whole document to streak past). Values lower than 16h will cause the P command to display fewer than 23 lines. Note that the actual number of lines EDLIN will display is one greater than the value at this byte.

> displayed offset 16 35 20 43 28 J. K. Bane

Pittsburgh, Pennsylvania

Value at

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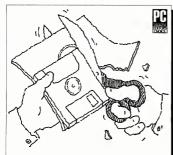
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Now I also lock up my mouse. Ronny Richardson Chamblee, Georgia

If you're working with sensitive information, you just can't be too careful. Mr. Richardson provided several useful security tips we published earlier-on making sure to obliterate "invisible" backup and temporary copies your software makes without telling you, and on flushing print buffers so later users can't come along and dump out their contents to your printer. These are especially worrisome, as users increasingly rely on hardware-sharing devices and big programs that spill files to hard disks when memory gets tight. It's true that anyone can defeat any security system, given enough time and resources. But the main rule is not to make it easy for them. Locking up mice may seem silly, but after all, a mouse is just another input device, like a keyboard.

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Playing cursor tricks in dBASE III Plus and Clipper; editing control codes and solving a startup problem in WordPerfect; importing ASCII files into Microsoft Word.

HIDING THE DBASE CURSOR There are times when a flashing cursor is

about as undesirable as another man's word processor, so I wrote the small assembly program shown in Figure I to turn the cursor off or on in dBASE III Plus programs. It's especially useful with a light-bar menu (or any other INKEY() loop) and with windowed error messages.

CURSHIDE.BIN uses a semidocumented feature of the IBM ROM BIOS. When setting the cursor type using the video interrupt, IBM states, "setting bit 5 or 6 for the cursor start line register] will cause erratic blinking or no cursor at all." A little experimentation shows that if bit 5 is set, the cursor stops flashing. It remains in the same position and the video output is not affected. CURSHIDE sets or clears bit 5 and does not affect the cursor stope.

Using the IBM or Microsoft macro assembler, you can create the necessary binary file from the assembly language listing using the following commands:

MASM CURSHIDE LINK CURSHIDE EXE2BIN CURSHIDE

Ignore the "no stack segment" warning you get after the linking step. The file CURSHIDE.BIN can now be used with dBASE III Plus using this convention:

LOAD CURSHIDE && starting program CALL CURSHIDE WITH '1' && restore RELEASE CURSHIDE && exiting program

The RELEASE command should only be used to free up memory at the end of a pro-

curshide csicodeseg onp byte ptr [bx], '0' : # means hide cursor hide_cursor ; go hide cursor byte ptr [bx],'1' ; 1 Means restore cursor err_exit : otherwise, parameter error eh,3h ; reed cursor position function ; for page 0 10h ; video interrupt ; set cursor type function ch, 11011111b ; bit 5 off turns cursor on yideo interrupt imp eh, 3h ; reed cursor position function ; for page 0 ; video interrupt ; set cursor type function ; bit 5 on turns cursor off ch,00100000b ; video interrupt short done jep err exit: · da = cs dx,offset err_msg ; pointer to message ; Dos int 21h function 9h done: err wag db @dh,@eh,'CURSHIDE: Bed perameter',@dh,@eh,'S' codesso ends

Figure 1: CURSHIDE.BIN, a LOADable binary file to hide and restare the cursor in dBASE III
Plus (ar any ather pragram that can LOAD and CALL binaries).



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gram. If it is executed when the cursor is hidden, you will not be able to restore the cursor without LOADing the program again.

Terry P. Sanderson Toronto, Ontario Canada

The dBASE III Plus manual contains a perfect example of when to use CURS-HIDE, in demonstrating the INKEY() function (page 6-30). A DO WHILE displays the time in the upper-left corner while awaiting the user's menu choice:

i = 0 DO WHILE i = Ø @ 1,72 SAY TIME()

i = INKEY() ENDDO

If you run this code in dBASE, the cursor leaps wildly back and forth-looking at it day after day would drive some of us crazy. CALLing CURSHIDE does the trick.

CURSHIDE is also very compact. LOADing CURSHIDE uses only 16 bytes of memory. Many other programs should be able to LOAD and CALL CURSHIDE as well.-Brad Stark

NO_CURSOR CLIPPER

An undocumented feature of Clinner lets you turn the cursor off (then on) when doing screen manipulations or INKEY() loops. To hide the cursor:

CALL SETCTYP WITH WORD (8) To unhide it:

CALL SETCTYP WITH WORD(1)

Dan Domzalski Buffalo Grove, Illinois

Hiding the cursor can sometimes add elegance to a screen (Nantucket used _SETC-TYP in some of its own menuing code). Why then was a valuable feature left undocumented for Mr. Domzalski to find? The best explanation I've found is that if a program is aborted (for whatever reason) while the cursor is off, it remains off when you land in DOS. Most end users won't know how to deal with this. For the programmer, too, losing the cursor is an added frustration during program development, when glitches and gremlins spontaneously materialize from within thoroughly checked and absolutely bulletproof code

Clipper's new version (originally to have been released in summer '87, then Indian summer '87, and now expected early in 1988) produces a syntax error if you call _SETCTYP. Much better, however, it provides the calls SET CURSOR OFF and SET CURSOR ON. And in the new version, if you abort a program with the cursor off, Clipper cleans up and restores the cursor at the DOS prompt.-Brad Stark

CONTROL CODES IN WP I recently discovered that you can get around WordPerfect's inability to search and replace all of its control codes (e.g., the begin and end boldface codes) by using the Program Editor in the WordPerfect Library. I needed to convert the underline codes in a file of bibliographic references to the Ventura codes for beginning and ending italics. I loaded the file into the Program Editor and found that the begin and end underline codes were ASCII characters 148 and 149, respectively. You can enter these into a search-and-replace string using the Alt key and the number pad. If you wish to preserve soft returns, you must select the Binary option, using the Interpret key Ctrl-F5 before loading the file. This prevents the program from replacing the soft returns with hard returns.

Michael D. Conner Kampsville, Illinois

You can search and replace the bold or underline codes within WordPerfect itself, as we've demonstrated in a previous Power User column. But it requires a special macro. If you have the Program Editor. this is a way to do the job directly. -Neil J. Rubenking

WESTARTIP

I recently solved a problem other users may be having with the start-up options of WordPerfect, Version 4.2. The start-up problem prevented my using the "exit-to-DOS-shell" feature.

My organization uses two-floppy-disk systems for word processing. I chose to use the RAM drive start-up option because WordPerfect frequently accesses the disk



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for special features. The "WP/R/D-C:" start-up option lets you load the main WordPerfect program into RAM (/R) and redirect overflow files, buffers, and printer files to another drive/directory, such as my 64k RAMdisk drive C: ('D'-C:).

When you use the "WP/R/D-C:" startup option this way, however, a problem occurs with WordPerfect's exit-to-DOSshell command Ctrl-F1. The shell command Ctrl-F1 works if you leave the Word-Perfect main disk in drive A:, but one of the big advantages of using a RAM drive option is that you can remove the main disk and replace it with the spelling checker disk, the thesaurus disk, or the like. This reduces the disk swapping needed to run the program effectively. But, when I used the exit-to-DOS-shell command, it couldn't find COMMAND.COM because I had replaced the main disk with the spelling checker. I solved the problem by changing the

AUTOEXEC.BAT file on my main WordPerfect disk to include the lines

COPY COMMAND.COM C: SET COMSPEC=C:\COMMAND.COM

This puts a copy of COMMAND. COM on my RAM disk and tells my computer to look for it there.

Dean C. McCallum Pensacola, Florida

Users of Wonfferfect, Version 4.2, may have noticed that it just basely fits on one floppy dist. Directing the temporary files to a RAM drive is avery good idea for anyone who's using a two-floppy system. But do note that the SET COMSPEC COMPSEC TOWN FOR FORE TOWN FOR FORE TOWN FORE OF TOWN FORE TOWN FORE

ASCII TO MICROSOFT WORD A couple of tricks can ease the chore of

cleaning up an ASCII document when you've imported it into Word. First, if the document has been printed

First, it the document has been printed to disk with a left margin, use the column feature to delete the column of spaces. Use Ctrl-PgUp (*PgUp) to move to the upper-left corner of page 1. Shift-F6 turns on the

column feature and lets you define the width of the column with the Right Arrow key. Finally, hit 'PgDn to mark the entire margin and Del to delete the blank spaces.

margin and Del to delete the blank spaces. Second, use searth-and-replace to get rid of the hard carriage returns at the end of search for two hard carriage returns at the end of separated by a blank line, search for two hard carriage returns (°p*) and replace them with a synthol not used in the document, such as a tilde. Then search for a single return (°p*), and replace it either hard preferred to the properties of the search of the single return (°p*) and replace it with a doubte carriage return (°p*) or a double carriage return (°p*).

Steven T. Lawrence Denver, Colorado

The same basic technique can be used land is-Ed.1 with other full-featured word processors, and now that Word 4.0 offers macros, you can take this trick further and automate the entire procedure. If you resularly import files from the same source using the same format each time, create a macro to do all the work with a single keystroke. If you import files from different sources, create a different macro for each step of the translation: one for deleting unwanted margins and one for deleting hard carriage returns. Then insert a PAUSE instruction as needed, so the macro will stop and let you manually change settings. For deleting a left margin of spaces, for example, have the macro stop to let you define the width of the left margin

Alternatively, Microsoft recommends WordExchange for transferring files between Word and many other formas—including ASCII. WordExchange is \$69.96 from Systems Compatibility Corporation, (312) 329-0700.—M. David Stone

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LANGUAGES



A BASIC attribute that mirrors DOS's exist; a C macro for centering on-screen text; avoiding CGA-generated "snow"; and a procedure that checks for an 80x87 chip.

TURBO BASIC

MIMICKING DOS'S EXIST IN BASIC

To determine if a particular file exists, or if the correct disk is being used, the method usually used is to attempt to open the file for input and see if an error occur. Turbo Basic's Call Interrupt command allows a more elegant solution, which I have incorporated into the function FileExist (see Figure I).

Figure 1).

FileExist calls on the DOS service to find the first occurrence of a given file specification, and if it exists, then the AX register returns holding a zero. Otherwise, AX will contain an error code. One handy feature of this particular DOS function is that it also accepts wildcards and paths.

John Julian Pontiac, Michigan

Because Mr. Julian has included the ability to search based on a file's autribute as well as its name, this function can also find hidden and system files. File attributes are a powerful bus seldom-used feature of DOS; for example, making a file read-only will prevent it from being overvitien by an inadvertent COPY or ERASE command.

To specify a file attribute with this function, you will need to consider the individual bits comprised by the attribute byte. The assignment of bits is illustrated in the diagram "Attribute Byte Encoding," For example, to search for hidden files only, you would use an attribute of 10 binary, which is 2 in decimal. To search for files that are both hidden and system, you 'filexist.bas - reports if a file exists in a Turbo Basic program def fnFileExist(FSpec\$, Attr) local SSeg, Offset, Desc 'find Turbo's string segment at def sea address 8 in default segment $sseg = peek(\theta) + peek(1) * 256$ FSpec\$ = FSpec\$ + chr\$(0) 'make an ASCIIZ string for DOS 'find its descriptor in memory Desc = varptr(FSpec\$) 'find the actual string address Offset = peek(Desc + 2) + peek(Desc + 3) * 256 reg 1. 6h4E00 'DOS find first function in AX req 3, Attr 'put sttribute to find in CX reg 4, Offset 'put offset of string in DX 'put segment of string in DS req 8, SSeq 'call DOS to search for file call interrupt 4h21 FnFileExist = (reg(1) = 0) 'AX is zero if it's there end def FileNameS = "\COMMAND.COM" 'look for COMMAND.COM Attribute = 0 'search normal files print FileNameS: if fnFileExist(FileNameS, Attribute) then print " found" print " not found" end if

Figure 1: A Turbo Basic function to determine if a file exists.

Attribute Byte Encoding

not used Archive Archive Subderectory Midden System The organization of his in the DOS He attribute byte

STR CENTER(string);

■ LANGUAGES

would use 110 binary, or 6 decimal,

One of the best sources for information on the various DOS services that can be accessed with Turbo Basic's Call Interrupt is Peter Norton's Programmer's Guide to the IBM PC, published by Microsoft Press -Fthan Winer

CENTERING TEXT OUTPUT

I've found that a feature of the Standard C

library can be used to center output to the screen. The formatted-print functions, printf(), fprintf(), and sprintf(), support a variable field width that can center output

if used properly. While a typical printf() statement has

the form:

printf("%s", String);

printf() can also be used to right- and leftjustify output by specifying a field width, the number of spaces in which the string is to be printed:

```
/* right-justify */
 printf("%20s", String);
/* left-justify */
 printf("%-20s", String);
```

In this example, the "-" directs printf() to left-justify the output, and the "20" designates the width of the field in columns.

The field width may be left unspecified until runtime by using an "*" and inserting a field width argument:

printf("%*s", width, String); where "width" is a variable that specifies the runtime field width. I "center" a string by actually printing

two strings: the first is a single blank character. It's right-justified in a field whose width is set to the number of spaces needed for centering the second string. For example, you could enter the command

printf("%*s%s*,width, " ",String); where "width" is the number of spaces

needed to precede and center "String." To calculate the preceding field width (where centered text should begin on a line), subtract the left margin width from the right. This gives the remaining space Figure 2, performs this process automati-

```
/* STR CENTER() macro: prints IN STRING centered vie printf() */
#define LEFT MARG 9
#define RIGHT MARG 72
#GOTING RIGHT MARG 72
#define TEXT WIDTH (RIGHT MARG-LEFT MARG)
#define STR CENTER(IN STRING)
                                     printf("tosts\n", LEFT MARG \
     + (TEXT WIDTH-strlan(IM STRING)) >> 1, " ", (IM STRING));
    /* A test driver for STR CENTER() */
main()
    char *string = "This message will appear Centered between margins 9 & 72.";
```

Figure 2: The macro STR_CENTER() automatically performs the field width calculations needed to center text.

```
/* cecter.c
   Gaege: cecter <1 | 2>
          cecter 1
                                 wrints a centered string to the screec wrints a centered string to the prictor
          cecter 2
 · To compile:
               cl center.c
#include<stdio.h>
```

************************************* /* centers the text passed in string between the right and left margin

cecter(left margin,right margin,string,destination)
int left margin,right margin;
oher *string;

*destination: FILE fprintf(destination,"%*s%s\n", left margin +
 ((fright margin=left margin) - strlen(string)) >> 1), " ", strleg);

/* maic(): e test driver for center() **********************/ main(argo, argv) int arec:

cher sterms cher *string = "This message will appear Coctored between margins 9 & 72."; int etoi(),i;

```
if(argo == 2)
if( ((i = etoi(argv[1])) > 0) ss ( i < 3))
           ter(LEFT_MARG, RIGHT_MARG, string, (i = 1) ? stdout : stdprn);
        exit();
priotf("\nUsege: center <oun>\owhers num is 1 (screen) or 2 (printer)");
```

exit();

Figure 3: CENTER.C demonstrates the use of the center() function, a variation on STR_CENTER().

between margins. Next, subtract the | length of the text from it and divide the result by two. This results in the number of spaces from the left margin to the start of the text. Adding the left margin width gives you the total space that precedes the

centered text on the line. The macro STR_CENTER(), shown in

cally. It uses a right shift operation to perform the division by 2 and improve the speed of the operation Vance Bass

Knoxville, Tennessee

Calculating the number of spaces needed every time you want to center text in a program is extremely tedious. Mr. Bass's

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STR_CENTER() macro is extremely useful in this regard and simplifies this effort for C application programs, It's also a clever use of the relatively unknown "unspecified field width" capability of the formatted print functions.

Writing STR_CENTER() as a macro simplifies source code and makes it more readable. Since the C compiler will insert the contents of a macro definition wherever the macro occurs, the macro executes at the fastest possible speed, as if you had handwritten its contents "in-line." A greater object code size will result, however, if the macro is used frequently.

I wrote the function center() as an alternative to the STR_CENTER macro. While it is based on Mr. Bass's original algorithm, repeated calls to center() will not increase your object code size as significantly as with STR CENTER. And using it as a function lets you keep it handy in a favorite function library.

Center() requires you to specify the left and right margins when it is called, which means that they need not be locked into your program (they can be passed from the command line or a configuration file). Center() also takes an argument specifying whether output is to go to the printer or the screen, which makes it a little more flexible for generating forms.

The program shown in Figure 3, CEN-TER.C, demonstrates the use of center(). CENTER.EXE uses the following syntax. To center the output on the screen:

center 1

To center the output on the printer:

center 2 -Richard Hale Shaw TURBO PASCAL

COPING WITH THE CGA

When you use direct screen memory addressing, CGA systems generate visual noise. In several programs, I have had to save the screen for later use. I found that even just reading screen memory causes the snow. To prevent the interference, I now turn the video off, read screen memory, then turn the video back on.

Robert E. Cady

Virginia Beach, Virginia ited amount of time without the chip, as

```
PROGRAM Video_on_off;
UND
 N : Integer;
 CH : Char;
  PROCEDURE Vid On(On : Boolean);
 CONST
    VidPort = S83D8;
                              (83B8 for mono)
    VidEnable = 8;
  BEGIN
    IF On THEN
     Port[VidPort] := Port[VidPort] OR VidEnable
    ELSE Port[VidPort] := Port[VidPort] AND (NOT VidEnable);
BEGIN
 clrscri
  FOR N := 1 TO 40 DO Write('0000000000000');
  WriteLn:
  Write('
          This program is configured for the Color');
  WriteLn(' Graphics Adaptor. To change');
  Write(' it for the MONOCHROME Adaptor, change ');
  WriteLn('the constant VidPort to $3D8.'):
  Write(' NOTE that this technique will not work');
  WriteLn(' on the Enhanced Graphics adaptor.');
  WriteLn;
          Press "-" to turn the video OFF. "+" '):
  Write('
  WriteLn('to turn it on, "Q" to Quit.');
    Read(Kbd, CH):
    CASE CH OF
      '-' : Vid On(False);
      '+' : Vid On(True);
    END:
  UNTIL UpCase(CH) = 'O':
```

Figure 4: Turning CGA video on and off with Pascal.

The procedure Vid_On, in Figure 4, is configured specifically for the CGA. That's because you don't need to turn off the video on the monochrome adapter-it doesn't make snow. If you want to turn it on and off for some other reason, just change the port address from \$3D8 to \$3B8. Do note that this technique won't work on an EGA, because the ports are quite different .- Neil J. Rubenking

Turbo Pascal programs compiled using Turbo-87 will crash on a machine that does not have an 8087 or 80287 chip installed, yet Turbo Pascal provides no way to check for the presence of the numeric coprocessing chip.

use the chip if it is there. Robert S. Dohner A Turbo-87 program will run for a lim-

long as it makes no calls to the 80x87 for real-number manipulation. This makes possible the function Has87 that will check for the presence of the numeric coprocessor and make a graceful exit if it is missing. The program listing (Figure 5) illustrates the use of the function. The key is to check for the presence of the chip right at the start and then halt immediately if none can be found.

Unlike the submission in User-to-User (see "8087 Sniffer," PC Magazine, April 28, 1987), Has87 does not rely on the switch settings but checks directly for the presence of the chip. My experience has been that most programs that use the 80x87 do not care about the switch settings but

Winchester, Massachusetts

■ LANGUAGES



Figure 5: An empirical test for the presence of an 80x87 chip.

I trust this empirical check a lot more than I'd trust the switch settings. Would you trust a switch that has to be set to the off position to mean it is actually on? -Neil J. Rubenking

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PC TUTOR



Hard disk drives without park-and-lock heads invite disaster. PCPARK2.COM can both save your data and teach you about hard disks and assembly language programming.

PARKING A HARD DISK

In the PC Tutor of December 22, 1987, I presented a short progrom for parking the heads of a hard disk. Several readers wrote and inquired obout the details of the program and how it operated. Here, then, are both a detailed explanation and an expanded version of the PCPAKK program. Let's start by reviewing the architect-

ture and terminology used in connection with hard disks. The anatomy of a hard disks is a logical extension of the floppy disks. A floppy, however, contains only a disks. A floppy, however or the floppy while a hard disk can contain only a while a hard disks. Called a plate moment on a single spindle. Each plate the shadow of the shadow

The device that does the reading andwriting of data is called a bead and issilate (in principle) to the recording head in a distance of the recorder. A separate readivirie head is provided for each recording surface on the disk. Like the checks heads are numbered from 0. Because the heads are numbered from 0. Because the there are more than two, the sides are unthere are more than two, the sides are unber. The terms "side" sead number. The terms "side" and "head sides but refer to the fourth recording useful.

All the heads are mounted together on a movable arm, called o servo positioner. The arm moves the head assembly along a line from the outer edge of the platter to the center, somewhat like o phonograph arm. But while the phono arm moves smoothly, the disk heads ore restricted to moving in discrete stens, driven to what is colled (logically enough) o stepper motor. This movement creates a series of concentric rings of data known as tracks. A 360K diskette has 40 tracks, while a large hard

disk may have over 1,000.
To a programmer, all the tracks created on all the sides when the heads are at a
single position are collectively known as a
cylinder. The terms "track" and "cylinder"
are easy to confuse and are gently
used interchon geobly. I tend to use
"track" when speaking because it sussir
to say, and "cylinder" when program
ing because it is easter to abbeviate
(CVL). Because the heads are tied togeth
cartes it, it has the tender it is the contrack sit has the sum effect as telling it to
move all the heads to track 5 of their respecific sides.

Each track is further divided into packets of data called sectors. Typical hard disks, using standard controllers, use 17 sectors per track, Other controllers, such

■ The heads in a floppy disk drive ride on the surface of the disk. But in a hard disk, the heads ride on a cushion of air less than the width of a hair. as the RLL variety, use special techniques to store up to 30 sectors per track. Unlike cylinders, tracks, heads, and sides, sectors are numbered from 1.

and the address on pooker of data on the hord disk, there coordinates much hord disk, there coordinates much hord disk, there coordinates much changing viduales is the one process that requires physical movement radially across the disk and thus is the most time consuming. When you hear of disks specified as 40-miliscond drives, this store pleas 40-miliscond drives, this store the crage time needed to switch between cylinders. Because heads are selected electronically, there is obnost not time insorted in switching among them. Finding which we have the control of the coordinates of the platter to rotote under the head. This can be a miles cases of delay.

THE LANDING ZONE. The broats in a flappy disk drive contally ride on the surface of the disk. This is acceptable because the floppy disk surface is flexible. The heads and the disk are subject to the same tand of weer as you might find in a VCR. But in a hard disk, the heads ride on of the disk by less than the width of o human hair. One drive manufacturer has compared the situation to that of a lumbo jet flying at 600 mph just 6 inches off the ground.

When the computer is shut off and the power removed, some hard disks, like the popular Seogate ST-225, just let the disk heads drop onto the surface of the disk. Extending the analogy of the jumbo jet, the picture is herible. The heads plow into the

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relatively soft coating of the disk, causing physical damage and passible loss of data. Unfortunately, damage isn't limited only to the crash site. Magnetic particles, sheared off by the impact, settle over the disk, causing random contamination and corruption of data. Move one of these disks while the heads are sitting on the surface and the damage increases.

Hard disks that employ more-advanced technology (and generally carry a higher price tag) have special built-in "park-andlock" hardware to prevent this disaster. Powerful springs hold the disk heads away from the platters. When the disk is turned on, the heads are forced down into pasition. When pawer is removed, the springs snap the heads back into a parked position and lock them to prevent further movement.

Rather than buy a new hard disk, a simple procedure-parking the heads-can prevent or minimize the damage caused each time pawer is removed. Data on a hard disk is written starting at cylinder 0 and moves toward the higher cylinder numbers as the disk fills. The highest-numbered cylinder on the disk will be the last one to be written. Unless your disk is nearly full, therefore, chances are that the last cylinder will be unused and will be a good place to position the heads for parking. Parking the heads is something like a controlled crash landing. By restricting contact to one cylinder on the disk, the potential for loss of data is minimized.

WORKING WITH THE BIOS To park the heads on any drive, one thing must be known: the number of cylinders in the disk. In the original PCPARK program, this information was obtained through the BIOS Return Current Drive Parameters function call. Despite its name, it doesn't return the parameters of the current drive. And the description published in many popular books of the parameters returned is incorrect. To call the function, load the registers as follows:

- AH = 8 DL = physical drive number
 - for which information is requested (9 = first floppy)
 - (80h = first hard disk)

Then execute an interrupt 13h. On return, the registers will hold the following:

- DL = number of drives responding DH = maximum head number
- (# heads 1) CH = maximum cylinders or track number (# cylinders - 1) (high two bits are stored
- in CL) CL = maximum sector number (lower 6 bits only)

The maximum cylinder number supported by the BIOS is 1023. In binary notation, this would be 1111111111, or 10 bits long. Since only 8 bits can be stored in the CH register, the leftmost 2 bits are placed in the leftmost bits of the CL register.

Once the number of the last cylinder on the disk is known, we must tell the BIOS to move the heads to that cylinder. This is done by calling the BIOS Seek service. The registers are assigned the same general meanings as for the Get Parameters function. So, in the same way, load the registers with

- AH = @ch
 - DL = physical drive number on which to move heads (0 = first floppy)
- (89h = first hard disk) DH - head number to select CH = cylinder number to select (high two bits are stored in CL) CL = maximum sector number (lower 6 bits only)

Then execute an interrupt 13h, as before. We don't have to worry about unpacking the cylinder number. The Seek routine exnects to see it in the same format as it is returned by the Get Parameters function.

THE PCPARK2 PROGRAM The DE-BUG commands used to create the head parking program are shown in Figure 1. First, make sure that the DEBUG program is in your current directory or in a directory specified in your PATH command. Then, start DEBUG and enter each of the commands exactly as shown. Press the Enter key once and only once at the end of each line, including the blank line just before the RCX instruction. When complete. PCPARK2.COM will have been created.

PCPARK2 first loads the DX register with 80h, the drive number assigned to the first hard disk installed in the computer. Note that since only the DL register is

checked for the drive number, the instruction could have been MOV DL.80. This would have resulted in a 2-byte instruction instead of a 3-byte instruction, reducing program size by 1 byte. But I have an ulte-

rior motive for using this instruction, which will become clear later.

The next instruction performs a subroutine call to offset 109h, which also reduces code size. Because the CALL places the address of the next instruction on the stack, the RET instruction at the end of the program will cause the same code to be executed twice. The second time, however, the RET instruction will return to DOS. terminating the program.

The next step is to determine the drive parameters, by loading AH with 8 and executing an interrupt 13h. If, on return, the carry flag is set, it means that this function is not supported, and PCPARK2 will not work. A message is displayed to that effect. As one reader pointed out, early versions of the PC and XT BIOS do not support this function call.

The Get Parameters function returns a lot of garbage we don't need. Remember, physical movement occurs only between cylinders. So, while we must pass values for the parameters that are in range, it doesn't matter what head or sector we seek to as long as it's on the last cylinder. The

```
A 100
MOV
        DX.0080
CALL
        8189
        DX. 8881
MOV
        AH. 00
PUSH
        DX
INT
        DX. 9137
MOV
JR
        911D
MOV
        AH, DC
POP
INT
        13
        8125
JR
        DX. 0126
MOV
MOV
```

N PCPARK2.COM

INT INC Byte Ptr [812c] DET DB "Drive 1 Parked" #D #A "S" DB "Park Not Supported" 8D 8A "S"

RCX 40 w

Q

Figure 1: Enter these DEBUG instructions exactly as described in the text to create PCPARK2.COM.

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Get Parameters call returns the number of drives installed in DL, destroying the drive number we loaded in the first instruction. The PUSH DX/POP DX instruction pair solves this by loading the drive number (0080h on the first call, 0081h on the second pass) back into the register. Only fullsize registers may be pushed and popped, so the 00 was placed in DH to provide a valid head number

The call to the Seek routine is then performed. The registers contain the maximum cylinder and sector number as returned by Get Parameters, and the head has been forced to 0. If the call fails, the carry flag will be set and a short message will be printed on the screen. If successful, a message to that effect is printed, indicating the number of the drive that has been parked. The RET instruction sends the program back to the MOV DX,0081 instruction, and the process is repeated for the second physical drive, if one is installed. The disk heads should always be parked before you turn off your computer. It also helps to park them when you will be away for a while

For those who have never heard a hard disk seek across its width, the sound can be somewhat disconcerting. Even though the heads are moving a large distance (relative to a single track), the stepper motor still moves a track at a time. This rapid on/off movement of the motor causes a "beeping" or "buzzing" sound. This noise is natural and nothing to worry about

Should you decide not to shut off your computer, the next disk access will cause the heads to travel just as far to get back to the data as they did to leave it. The result will be more buzzing. And if you hear a "clunk" as the heads find the last cylinder, relax-you're parked safe and sound.

ASK THE PC TUTOR

The PC Tutor solves practical problems and explains points of general interest about using your hardware and software 401-732-5556 more productively, and answers basic questions about DOS and systems in general. To see your questions answered here, drop a line to PC Tutor, PC Magazine, One Park Avenue, New York, NY 10016. We're sorry, but we cannot answer questions personally.

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Two batch programs designed for LANs; AUTOEXEC BAT, to be shared between all workstations; and N COPIES.BAT, to limit the number of active copies of an application.

USING SINGLE-USER PROGRAMS

The question of how to legally use a nonnetworked application program on a net-

gram but to load only ane capy an the servwork bothers many system administrators, erfor all to share. The other copies sit on a work grows you probably don't need a

An accepted procedure in many argan- | shelf unused, but they serve the legal/morizatious is to buy several copies of the pro- al function of showing an attempt to comply with licensing agreements. As the net-

REM The variable %8 comes from the REM name typed on the command line to REM call this procedure file. If the REM file you want to run in named REM OURWP.EXE, then name this file REM OURWP.BAT. Call it by entering only REM OURWP on the DOS command line. :FindCopy

REM See if a copy is available SET MyCopy=none

FOR \$8f IN (C:\88\88*.in) DO SET MyCopy=%%f IF '%HyCopy%' mm'none' GOTO SoSorry

Checkout REM Check out a copy of the program

ECHO ECHO Checking out one copy of %8 ECHO (My Copy is %MyCopy%) ECHO RENAME %MyCopy% *.out

REM(You could rename it to UserID.OUT)

REM Could LOG this activity REM A good place for PUSHDIR >nul

CD \98 REH You could use an IF '%1' == '' to REM substitute default parameters. REM If the program to is a BATch file REM itself, you must call it with

REM command.com /C 88 81 82 83 84 85

CD \ REN A good place for POPDIR >nul REM Find a .OUT copy to return SET MyCopy=none

FOR %%f IN (C:\%#\%#*.out) DO SET MyCopy=%%f IF 'SMyCopys' == 'none' GOTO end

REM Return the copy you found.

ECHO . ECHO Making %MyCopy% of %# available

RENAME %MyCopy% *.in GOTO end

SOSOTTY REM Comes here if all copies in use.

ECHO Sorry, all copies of %8 are in use: ECHO Please try again later.

REN Could log this event so you know REM how often you ran short! GOTO end

end ECHO .

ECHO .. To restart this procedure, type: ECHO .. 88 81 82 83 and (Enter) ECHO .. or press F3 and (Enter)

ECHO . REM Release the space used in the environment SET HYCODY=

ECHO Your current drive & directory is:

Figure 1: A batch file to limit the number of active capies of an application used on a network.

■ CONNECTIVITY CLINIC

shelf copy of every program for every network station. Everyone doesn't use all the programs all the time. The following batch file (see Figure 1) tracks the number of copies of a program in use.

The N_COPIES.BAT file limits the number of active copies of an application to the number of licensed copies. It lets you enforce the observance of the software license agreement by preventing more than

the authorized number of users. It does nothing else to turn a single-user package

into a multiuser package. To use N_COPIES.BAT, you install one copy of the application program on a network file server. The program you want to call is a .COM or .EXE file. (Use COM-MAND/C to call other batch files as indicated in the REMs.) The networked drive is assumed to be C:. Substitute whatever networked drive is appropriate.

In the application directory on the server, you should create as many check-in files as you have legal copies of the program. These files should be named File-

■ The N_COPIES.BAT file lets you enforce

the observance of the software license agreement.

naml .IN. Filenam2.IN. Filenam3.IN. etc., where Filenamy is the name of the shared application program. When a copy of the program is in use, one file will be renamed Filenamy, OUT. If no .IN files are available when you try to use a program, you get a message saying that all the copies are checked out.

The only problem occurs if the application always uses the same "scratch" files. If five people use the same word processor on the same file server, they will all try to create and manipulate the same scratch files. If this is a problem, then perhaps you can log in to a different disk drive once the program is running.

Greg Campbell Arlington, Virginia

SHARING A SINGLE AUTOEXEC.BAT One task of a network administrator involves keeping the AUTOEXEC BAT file

on every workstation current. Here is a batch file (see Figure 2) that makes the job easier by sharing a single AUTOEXEC .BAT among all LAN workstations. This specialized workstation AU-

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TOEXEC.BAT lets you start your LAN workstations from a floppy disk (or a hard disk) and then transfer control to an AU-TOEXEC.BAT file that's maintained on a file server. The advantage is that the net-

work administrator keeps only one AU-TOEXEC.BAT up to date and doesn't have to modify all the start-up disks. Greg Campbell

exps only one AUo date and doesn't
butt-up disks.
Greg Campbell
Arlington, Virginia
copy of the command processor to be load-

ECHO OFF IF NOT EXIST E:\autoexec.bat GOTO NotFound CT.S REM ** Else ** ECHO *** LAN Workstation AUTOEXEC *** ECHO . ECHO Transferring control to Centralized REM These are sample environmental ECHO AUTOEXEC. BAT procedure. REM variables used by batch files and REM applications. REM Substitute appropriate drive letter SET CDRIVE=YES Et SET BRAND=COMPAO autoexec.bat SET MONITOR-EGA REM Don't expect to return to this REM The following command calls a REM procedure file: :NotFound REM separate batch file used to log REM the user onto the network. ECHO . ECHO Oops - No Autoexec.bat found command /c logon.bat REM Test for the server AUTOEXEC.BAT. ECHO on the server.

REM Pathnames only work on DOS 3 and later.

Figure 2: This AUTOEXEC BAT file is used by all workstations on a LAN.



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ed, the program specified by filename to be executed, and the control to be returned to the calling batch file. Since batch files in versions of DOS prior to 3.3 cannot call other batch files, this is the most stroightforward method of approximating batch subroutiues. If you're using DOS 3.3 or later, you can substitute CALL filename.

Users should also note that any batch files colled as subroutines may read the environment strings but should not set or change any of the strings. When the sec-

 With this specialized workstation AUTO-EXEC.BAT maintained on the file server, the network administrator keeps only one AUTO-EXEC.BAT up to date.

ondary command processor is loaded, it gets a new copy of the environment. Any changes mode by the "called" batch file disappear when the batch file ends.

Mr. Campbell creates orguments with the SET function that other .BAT files and applications can use to configure video drivers, virtual drive mapping, and other features. This script is generic, so you must supply your own log-in/log-on or other files specific to the network operating system you use.

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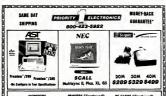




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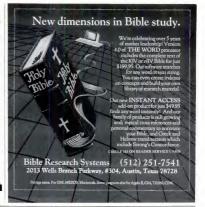
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How to Choose

The simplest way to choose would be to pick a single program that did all the forms and schedules that you need. Things are seldom as simple as they seem (see the accompanying table "Tax Preparation Programs: Summary of Features').

The most pragmatic criterion would be to look at your hardware first and be sure your PC has the memory required by the program. Additionally, if your PC isn't sporting a hard disk, a four- to six-disk program is going to be mechanically

cumbersome to use. Next consider your own approach to taxes. Are you comforted by the screen's fidelity to the IRS forms? Do you want to see where the cryptic questions are leading? Or would you rather have the forms fed to you just one bite at a time and completely count on the program to make sure that it all comes out right in

How much explanation do

the end?

you want or expect from a program? Is it sufficient to have the IRS instructions reiterated? Or do you want to have more questions and analysis right up there on the screen? How much do you trust any generic batch of queries to lead you safely through the IRS rules? Then you will want to con-

sider the printed result. The

forms and schedules printed by all these programs are acceptable for filing with the IRS, with the exception of Form 1040. This year, TurboTax and PC/TayCut create a facsimile of Form 1040 on a dot matrix printer that has IRS approval. And TurboTox. PC/TaxCut. and AM-Tax can all be used to output IRS-acceptable laser replicas of Form 1040. The other programs try to print out their results directly on Form 1040, but it's a tricky procedure to get everything perfectly lined

up-you may be reduced to copying the information by hand. The TurboTax philosophy is

to give you a close facsimile of the IRS forms, filling every line of the screen. All the details are there and if that isn't enough, a great deal of the instruction from the Form 1040 packet is available on-line at the touch of a function key. TurboTax is a fast, easy-to-learn, and easy-touse program of elegant design. It contains many valuable features that make the job of doing a tax return as painless as a mechanical aid can. And as a bo-

nus, it throws in a paperback

copy of The Price Waterhouse

Personal Tox Advisor.

1987/1988 Edition PC/TaxCut is unique in guaranteeing that those calculations built into the program really work-it will pay the IRS penalty incurred due to a fault of the program. However, it does acknowledge that every tax rule cannot be built into a program. Too many human choices out there. PC/TaxCut is a big program, nearly 2MB on six disks. It translates all the items on the forms to the plainest possible language, on a very clean

screen, a few at a time. AM-Tax, on a single disk, does an excellent job. It's a stripped down, no-nonsense. well-designed program that does the basics in a straightforward, easy-to-use fashion that makes good use of the function keys. And you can return AM-Tax for a full refund within 30 days if you're dissatisfied with

its performance. Tax Preparer packs an individual program and professional preparer features into one disk that uses the BASICA file from your DOS disk. Carrying the highest price tag in this group, Tax Preparer gives you the assurance of a time-tested approach and an excellent manual that delves deeply into the substantive tax questions.

For spreadsheet aficionados, EosyTax offers a template program that builds on your Lotus 1-2-3 skills while sparing you the labor of writing your own al-

gorithms In its first year of general distribution, Ask Don About Your Taxes is a program to watch for its use of artificial intelligence techniques. Ask Dan About Your Taxes has an interactive screen that solicits factual background data by queries. and then uses the information to propose an answer to be placed on the return.

As a tax lawyer, I find most of the attempts here to be quite creditable. But taxpayers with involved financial circumstances may find their questions to be far more complicated than these programs can resolve.

If All Else Fails

Good as these tax return programs are, you know, it's a funny thing. None of them do a Form 4868, the one for Automatic Extension of Time to File II S. Individual Income Tax Return.

Lauro Lou Meodows is a practicing tax lawyer in New York City.

Tax Preparation Programs: **Summary of Features**

	AM-Tax \$45.00	Ask Dan Abost Your Taxes \$69.95	EssyTex \$89.00	PC/ TextCut \$75.00	The Tax Advantage \$59.95	Tax Preparer \$295.00	Turbe- Tax \$75.00
No. of optional state-tax modules	3	None	4	None	1	1	26
No. of disks	1	4	1	6	2	1	2
RAM requirement	360K	512K	384K	312K	256K	128K	256K
Has running tax totals	•	•	•	•	•	•	•
Has calculator	•	•	•	•	•	•	•
Has substantive on-screen tax help	0	•	0	•	0	•	•
Presents simpli- fled tax forms	0	0	0	•	•	0	0
Tracks forms on-screen	•	•	•	0	0	•	•
Prints a dot- metrix form 1040	0	0	0	•	0	0	•

EasyTax

are confusing to taxpayers. The EasyTax Analyst fea-

ture compares your tax results with historical IRS figures for your tax bracket to show whether your deductions are more or less than the range or the average of other taxpayers.

Finally, EasyTax has a 3year tax planner that can be used independently of the tax return preparer. The tax planner also includes a summary of the new rules from the Tax Reform Act of 1986.

This year Valley Management Consultants plans to have state income tax return modules for California. New Jersey.

New York, and Pennsylvania. List Price: EasyTax, \$89. Requires: 384K RAM (640K RAM in order to use with Lorus

Symphony), one disk drive, Lorus 1-2-3 or Symphony, DOS 2.0 or later. Valley Management Consultants, 3939 Bradford Rd., Huntingdon Valley, PA 19006;

(215) 947-2507.

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Tax Preparation Software: A Final Look

"There is nothing so certain as death and taxes" goes the old adage. We know death is still a certainty when Congress is in session, but are federal income



taxes really so certain under that sprawling masterpiece of obfuscation known as the Internal Revenue Code of 1986?

In this issue and the last, we have taken a look at seven tax preparation programs that attempt to harness the PC to the search for certainty in the tangled thicket of tax rules.

Do these programs work? Yes, for the mechanical parts of the job. They type superbly, do the math (over and over, if changes are needed), and assist with some basic questions of interpreting the forms.

As for your decisions about what information to feed into the program, all these packages properly decline responsibility. You might think of this as the basic garbage-in, garbage-out disclaimer. The formulas can work only on the basis of the information you give the program. If you decided to deduce a proper of the program. If you decided to deduce you are likely to face a future of turgid correspondence with the IRS computers—which are a lot bigger than your PC.

Of course for many people, pulling together the necessary records and sorting through business expenses, broker's confirmations, interest and dividend returns, and the like are the big nasty no-fun jobs. These programs can't even begin to help with that part. But when you've organized all your tax information, you're ready to

t tackle adding it all up and putting the figures on the right lines of the proper forms.

If your financial affairs go much beyond the W-2 form from your first job and the interest the bank paid on your nest geg from Uncle George at graduation this past June, for example, this task may loom before you like a nightmare vision. At this stage, a PC with a good tax program is a godsend.

Same Tax Laws, Different Programs Each of the tax programs is

aimed at a slightly different audience from the others and each is designed with slightly different objectives. Some are trying to simplify the tax forms as much as possible. Some try to track the IRS forms. Some concentrate on being easy to learn and use. Some are templates that take advantage of your sophisticated proficiency with a spreadsheet program. Ultimately, all the programs do Form 1040, plus they do overlapping lists of supporting forms and schedules (see the table "Which Forms and Schedules Do You Need?"'), so all have many similarities. For any form not included in a program, whichever program you use will tell you to do the form by hand and transfer the bottom line to the place in

the supplied form where the re-

sult belongs-the program will

take it from there.

Submitting in the Right Style

Tired of scouring banks and post offices for tax schedules? Frustrated with attempts to line up your dot matrix's printhead with the line at the top of the schedule your software needs to see before it can put the numbers made the boxes?

Relax, The IRS can ask many things of you but it does not demand that you use its preprinted forms. There are several approved methods for submitting your return. Most of the programs we've reviewed here and in the last issue can generate forms and schedules that will pass muster, even if they don't look as good as the IRS's. The IRS even relaxed the rules this year to accept entirely do-matrix-penerated forms.

In fact, for personal filling, all the RRS really wants to see are the numbers in From 1000 primed in the specified format. The form doesn't need to be printed by the IRS: it approves forms submitted from many printers. On supplemental forms and submitted from many printers, of the proposed printers and the specified printers are supplemental forms and use and point it in one of two ways, on lined computer paper as a common figures, or in specified places on on otherwise habita, page. All blace baxes and long questions don't need to be there! If you use the second method, the IRS will use a transparent overlay when it needs to is identify the numbers. High-end programs needly tags nodes numbers the IRS deficiency for program needy tags nodes numbers that the Microscots (1001 feet).

You can buy preprinted continuous forms from stationery preprinters like Richmond Forms. It selb a 50-pack of 1040s for \$7.50; transparencies for about 55 per page; and 27 state forms (tel.; (804) 379-8723; a \$10 minimum order is required).

If you want really good-looking forms with the least amount opfining aggravation, you can use an HP-compatible lear for cartridge. Hewlett-Packard and Center Piece Software of Richmond, Virginia, make them, Of course, you'll need a program that understands it (ChipSoft, Best Software, and CPAids publish programs that dol and a reason to justify the greater-sham-S00 expense.—Gust Vendittu

EasyTax

(continued) takes to learn a new program by trading on the 1-2-3 skills

you've already mastered.
When you load the EasyTax

program, you see formulas, Lotus-like moving-bar menus, and cell entries appearing at the top of the screen as you call them up or key them in, as you do using 1-2-3. Start with the Forms menu and ask for Form 1040.

At any point during the operation of Ask Dan About Your Taxes, you can pop up The Bottom Line window.



Electronic Filing: The Future of Federal Income Tax Return Filing

Now in its third year, the IRS's electronic filing pilot program is still available only to tax professionals who qualify with the IRS. This is mostly due to the fact that the returns must be filed in a specific format and exacting guidelines must be followed.

To take advantage of electronic filing, you must live in one of the 14 areas designated to be a part of the pilot program, and only 20 of the most-common forms can be submitted. In addition, you must have a refund coming to you—it will be deposited directly into your bank account. And your return must be submitted by an IRS-approved tax professional.

Of the estimated 108 million income tax returns that will be filled for 1987, as many as 30 million may be eligible to be filled electronically. The IRS estimates only 2 to 5 million will be, a substantial increase over the one-half million returns submitted electronically for 1986.

What are the advantages of electronic filing? First of all, it climinates paperwisk. Currently 4 billion cubic feet of storage space—at a cost of \$36 million per year—is needed to store feet—at a returns. Electronically filled returns have substantially fewer errors than those filed on paper—only 3 percent as opposed to 20 percent. Electronic filling speeds the date entry process into the IRS computer since government employees don't have to recent ret dudit, And this sayes transvers more, as well

as climinating delays in processing.

SPEEDS COP, (tel.: (61) 341-0920) is a communications company that allows tax professionals to upload returns to it—it has the high-speed equipment and communications software to first transmit returns and then make sure they have been received intact by the IRS.

Two companies with personal tax preparation software, ChipSoft (TurboTax) and HowardSoft (Tax Preparer), are already using SPEED>S Corp. to file returns electronically and are incorporating the IRS electronic filing guidelines into their programs.

The electronic filling program is not a half-hearted effort to of research and dedication on the part of the RS is involved. So what is the future of the program? Next year more forms will be eligible to excepted and more regions of the United States will be eligible to use electronic filing. However, due to the fact that every-thing must be ubmitted in a specific format, only IRS—approved tax professionals will be able to use electronic filling to submit tax returns.

But by the mid-1990s the IRS hopes taxpayers will be able to file their returns electronically from anywhere in the world and that someday you'll be able to pay your taxes with your credit card.

Card.
To find out more about the IRS electronic filing program, call (800) 424-1040.—Catherine D. Miller

The top portion of the form appears superimposed on the Lotas 1-2-3 spreadsheet, which retains the letters designating the columns at the top and the row numbers running down the lefthand side. As you fill in the blanks, the screen scrolls down to display the rest of the form.

Protected cells prevent you from entering a response for an item that depends on figures from a supporting schedule. Type F5 and, from the menu, the letter or number of the schedule or form you need. EasyTar now moves you down to the distant reaches of the speradsheet, where the pertinent form is waiting. Entries on the supporting schedules are tailled and carried automatically to the proper place on Form 1040

when you press F9. The author's design philosophy is to let you know about legal limits on entries but-where there are subtle exceptions-not to lock you into the limits that may affect most, but not all, cases. For example, in the beta version I ran, the program accepted my claim of a too-large deduction of \$3,000 for an individual retirement account. But on the same line, right next to the place for the entry on Form 1040, EasyTax had written in legal limit \$2,250"—the limitation amount calculated on the basis of other factors in the return. This capacity allowed me to try alternative deductions to

see which would bring me the greatest benefit. Of course, this flexibility might have been achieved with an override feature; the maker of EasyTax elected not to include an override feature on the grounds that overriding the built-in formulas would change the calculated re-

sults in unpredictable ways. For Schedules A (Itemized Deductions) and E (Supplemental Income), EasyTax has a detailed record keeper that can be used to keep track of deductions throughout the year and that then enters the totals directly onto the tax forms. For other items requiring additional lines or those you'd like to back up, there is a notepad feature that you can use to make your list: the total is transferred to the anpropriate form, or you can merely save the notes and print

them out.

To see how the tab is mounting as you work your way through a return, a two-line 'rodometer' is permanently in view near the top of the screen to tell you the amount of tax paid, the effective tax rate, the marginal tax rate, and the tax owed or refundable.

New this year, but unfortunately not quite ready for evaluation at the time of this review, are about a dozen and a half help screens that will explain tax rules that apply to the lines of

the return that most commonly

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frames, Speakeasy annual fees are far less than most other statistical software packages. No add-ons are needed for modeling, color graphics or forecasting. The micro version is available for \$475.

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Ask Dan About Your Taxes

The most ambitious new entry for income tax return preparation this year is a program called Ask Dan Abaut Your Taxes, from Legal Knowledge Systems. This program attempts to go beyond the simple calculation of your taxes using data that you happen to volunteer.

For more than 20 common tax situations, an interactive series of questions prompt you to supply the information a tax specialist would need to determine how to report a tax item. Adapting techniques from the field of artificial intelligence. Ask Dan evaluates your answers to its queries, branching where necessary, and draws conclusions about if and how each item should be resolved.

For example, while working with Schedule D (Capital Gains and Losses) when I tested the program, the Ask Dan feature presented a series of over a dozen short screens posing questions about an asset 1 said 1'd sold this year. First I answered that the asset was not a security. I was told that Form 2119 should be filled out if the asset

was a home. Since this wasn't the case, the program went on to inquire about the nature of the sale. Some of the questions were posed in simple yes-or-no format, but were quite sophisticated in their thrust.

Then I went back and told Ask Dan that the asset was a short-term sale of a security. Successive screens gave four definitions of shart term and suggested getting the advice of a tax professional if I had short sales, exercised options, or dealt in strattles.

The program told me to fill out Form 4797 if the asset I sold was small-business stock. Then I was asked if the sale was a tax-

able event, and—after noting that most sales were taxable events—the program prompted me with four circumstances that often are not: like-kind exhanges, estanges, exchanges, of stock in corporate reorganizations, conversions of bonds, and transfers to a spouse in connection with a

od drocce.

The next question was swhether the gain or loss realized by the sale of the asset should be recognized this year. Again I was prompted, this time about di installment sales and consider-ation that in not really tradable.

Another screen brought up the rules for determining the hold in period, including exceptions for gifts, involutinary control versions, real estate investment runs distributions, and automater trust distributions, and automater.

ic reinvestment plans.

Ask Dan is designed to deal with the basics smartly, too.

In the normal operating mode, the secreen shows a close replica of the IRS tax form or schedule to be filled out. When items on Form 10/01 require one of the 24 supporting forms and schedules included in the program, you can toggle to the supporting form, fill it out, and then toggle back to Form 10/01 to see the results carried to their proper slace.

Some forms or entry items have special scratchpads that will help with underlying calculations while also preserving your work.

When experimenting with your figures, you can toggle back and forth from schedule to form, checking the results at any point in a window called the Bottom Line, which is invoked from the menu found at the bottom of the screen.

After you have entered the numbers for your tax return, activate the Scenarios feature. This feature allows you to run up to five scenarios at once, testing what the tax results will be if, say, you sell your fouse, if you sell your Galaxy Inc. stock, or if you sell your dog.

A big 1.2MB grogeram on

four floppy disks, Ask Dan does

best on a hard disk, zipping along from one form to the next. The forms and schedules are easily invoked from pop-up menus running along the bottom

line of the screen.

Ambitious as Ask Dan is, I
would offer a few words of caution. The version I tested was
the late-November package,
which included a draft of the
manual. Since this is the program's first year on the market,
the publisher's debugging process has not had a much time to
run as some of the other tax
preparation packages. Any program this new and comprehensive should be used with care.

Plans for the future include the addition of more questions, along with guidance for common tax items that are fraught with fine complexities.

Ask Dan About Your Taxes gives us an intriguing and pragmatic preview of how expert systems may help the intelligent layman help himself in areas normally the province of spe-

List Price: Ask Dan About Your Taxes, 569, 95. Requires: 512K RAM, two disk drives thard disk drive recommended), DOS 2.0 or later. Not copy protected. Legal Knowledge Systems Inc., 195 Maplewood St., Watertown, MA

Maplewood St., Watertown, MA 02172; (800) 338-1866, (617) 923-2322 (in Mass.). CIRCLE 664 ON READER SERVICE CARD

EasyTax

For spreadsheet jockeys, it's a snap to hamess up EasyTax to your copy of Lotus 1-2-3 and trot right through Form 1040 and 16 other forms (along with a major measure of your liquid assets) that you may owe Uncle Sam this spring.

Contained on a single floppy disk, EasyTax, from Valley Management Consultants, transforms Lotus 1-2-3 into an income tax return preparer, planner, analyzer, and yearlong record keeper. The great attraction of EasyTax is that you can cut short the time it usually

Findin Sched	ng the Forms and ules You Need	
Tax preparation package	Forms	Schedules
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	2210, 2441, 3903,	D, E, R,
	4562, 4972, 6251,	SE
	8615	

Tax Preparer is not for everybody.

ook. If I were filing a 1040-EZ, I'd just do it by hand. But my return is a lot more involved. I need software that's more than just blank forms and a calculator. I need a power tool. So I use Tax Preparer® by HowardSoft®.

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I get total accuracy and self-consistency. No inadvertent mistakes. And my return is backed up with the kind of thorough detail the IRS likes to see. What's more, it's reflected to make a change, it's reflected throughout the entire return.

I don't ross the whole thing out on April 15th, either. I can test "what it" scenarios accurately, because the Tax Reform Act is built in past 1990. And when the next tax season comes, I just order an update from HowardSoft. It transfers the data I've already entered to



whatever new forms and formats the IRS has come up with. Doing my taxes just gets easier every year.

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It's no wonder reviewers have called Tax Preparer the leader in tax software since 1980. It's like having a tax expert on your ream. I know everybody doesn't demand complete control, flexibility, and accuracy when they work with their taxes. But then again, Tax Preparer is not for everybody.

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Professional packages at personal prices available for IBM-PC and compatibles (\$295) and the entire Apple II family (\$250), with low-priced annual updates. Related products include our California Supplement¹⁰ for preparing the state return starting with Federal data; our Partnership Edition¹⁰ for preparing Form 1065 and its related forms and schedules; and Real Estate Analyze¹⁰ for analyzing income troberty before and after tases.

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In the second of a two-part series, Laura Lou Meadows reviews three more personal-tax-preparation packages: AM-Tax, Ask Dan About Your Taxes, and EastYax, And at the end of this After Hours section you'll find an overview to help you decide which of the seven tax preparation programs reviewed in these two issues is for you.

Getting a Jump on April 15: Three More Tax Preparation Programs

BY LAURA LOU MEADOWS

AM-Tax

AM Software's AM-Tax program for income tax returgram for income tax returpreparation is one of those rare good things that come in small packages—at a small price. The small package, just one floppy disk, holds the entire program, which does Form 1040 and 18 other IRS tax forms and schedules quickly, easily, with no lost time or motion.

What AM-Tax doesn't do are some of the fancier things, such as provide substantive on-line tax instructions or separate

AFTER HOURS

AM-Tax

An easy-to-use program that does the basics in a straightforward manner. Ask Dan About Your

Taxes

Uses artificial intelligence to go beyond the simple calculation of your taxes. EasyTax

A 1-2-3 template to figure your taxes and prepare for next year. planning features with tax rates for future years. When you load AM-Tax,

When you load AM-Tax, choose Set System from the initial menu and pick the monitor colors that you want for different categories of items. When you start working with Form 1040, the first few screens ask for identifying information and then lead you through the filling in of the dollar figures. The program follows Form 1040's for-

gram follows Form 1040's format fairly faithfully but manages to keep a clean screen by serving up small segments at a time. Instead of a forms menu.

supporting forms and schedules are accessed by typing F6 at the line of the form where they are pertinent. Use this technique at, say, Jine 33 ao f Form 1040, which depends on the supporting schedule and its laheled "Hemized deductions (Schedule A)." Press F6, and Schedule A) is called to the screen. When you are done with Schedule A, one keystroke will bring you back to line 33 ao F Form

1040.
To take it one step further, while you are still on Schedule A, move down to line 9a, which reads "Home mortgage interest from Form 8598." Press F6 to call Form 8598 to the screen.

| Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | Column | C

AM-Tax makes good use of function keys, selech are listed along t homom of the screen.

When you've filled out Form 8598, one keystreke will take you back to Schedule A and another will take you to Form 1040, transfering the figures to each form as you go. If you prefer to fill out the supporting schedule before you fill out Form 1040, page through the screens until you come to the line that mentions the form or schedule you want. Voila! The program puts a star at The

The program puts a star at each line that requires cither a supporting form or a specially tailored worksheet. Also included are general worksheets for other lines, which aren't associated with a particular form.

For lines whose values must be calculated by the program, the line is marked with a C and your cursor will not allow you to enter an amount on that line. If a calculated figure is inappropriate for a specific tax situation, AM-Tax's override function can be used.

be used. When you move from one schedule or form to another, the calculations that pertain to both forms are automatically updated. If you are moving along within a single form, pressing F4 gives you instantaneous recalculations when you change

> nem. The current status of the

function keys is always indicated across the bottom of the screen. The line just above keeps count of your total tax bill to date, the amount you still owe, and your tax bracket.

The best of AM-Tax's features are the speed and the simplicity of the program's operation. I found it both easy to learn and easy to use. But if I had not, I could have relied on the 72page manual as a model of clarity: about half of the manual is devoted to the tax forms them-

selves

The AM-Tax printous of all forms and schedules, with the exception of Form 1040, are acceptable for filing with the IRS. The alternatives to hard copying Form 1040 numbers from a draft printout to the actual IRS Form 1040 are to use overlays for photocopying or to buy lasse-printing modules (big bucks here) that do many tax forms. These modules are available from Nelco, located in Green Bay, Wisconsia.

Day, WISCORSII.

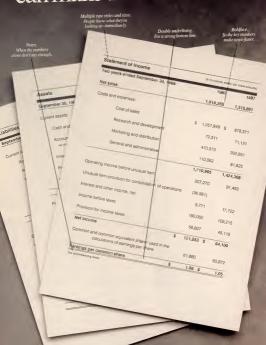
List Price: AM-Tax, \$45.

Requires: 256K RAM, one disk
drive, DOS 2.0 or later. Not copy
protected. AM Software, P.O. Box
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In*a*Vision, intermediate CAD application, Micrografx, Inc





Omnis" QUARTZ," multi-user data-base application, Blyth Software, Inc.

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